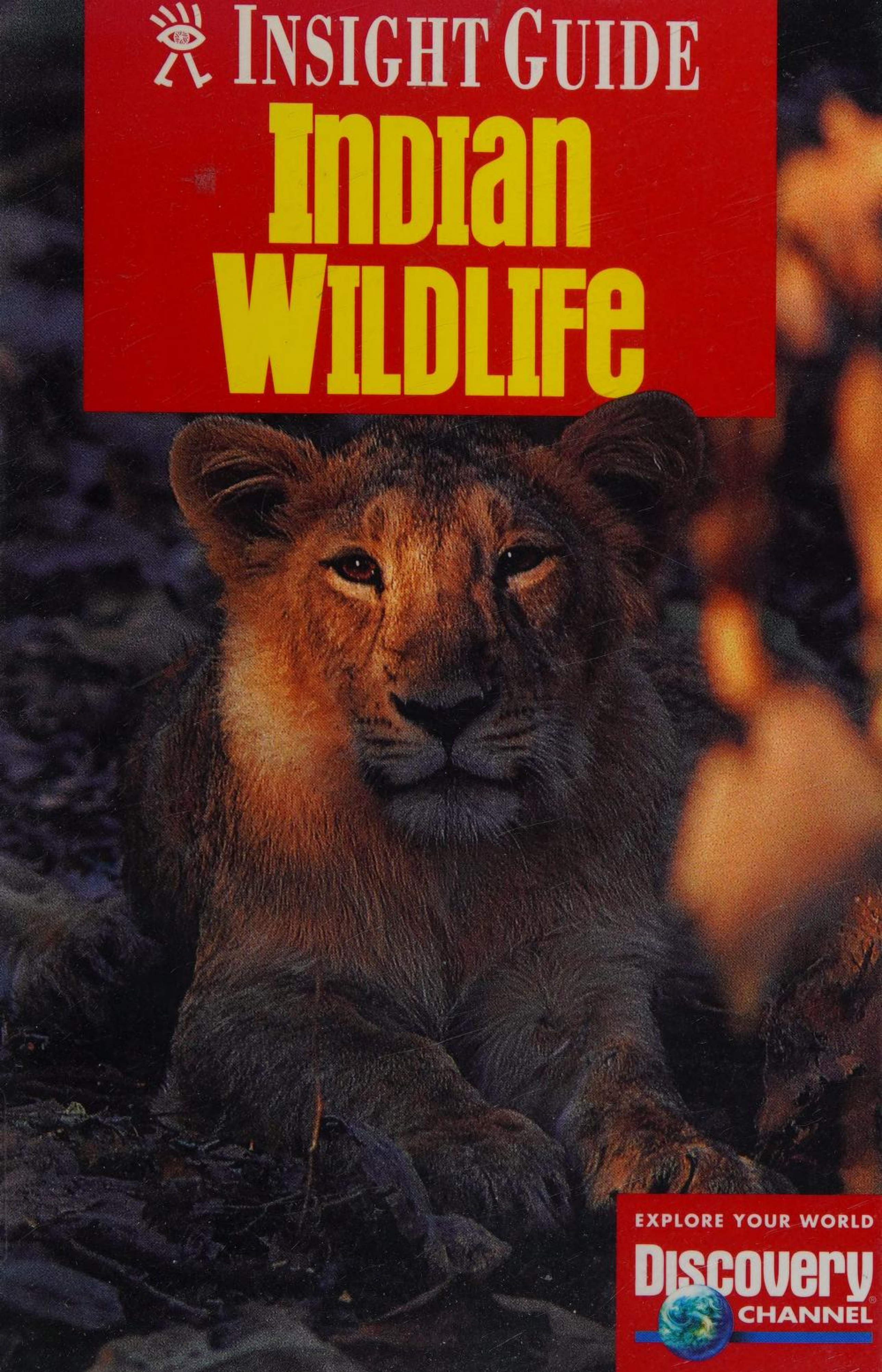
INSIGHT GUIDE

INDIAN WILDLIFE



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LOCATION FINDER

Special Features

The Asian Elephant.....75
The Indian Rhinoceros.....79
Observing Indian Wildlife 39
The Tiger 59

Habitats

The Forests 49
Marine Life.....163
Wildlife of the Himalaya 149
Wildlife of the Indian Desert.....155

Wildlife Parks

Bandhavgarh 253
Bardia.....209
Chitwan 202
Corbett.....187
Dachigam 179
Dudhwa 196
Gir 241
Kanha 246
Kaziranga.....215
Keoladeo Ghana (Bharatpur).....225
Manas.....218
Mudumalai.....268
Nagarahole and Bandipur 259
Periyar 273
Ranthambore 233
Sariska 236
Sri Lanka's National Parks 293
Wilpattu 285
Yala (Ruhuna) 288

Fauna

Birds, Resident and Migrant.....133
Deer, Antelope and Bovines.....83
The Dog Family, Hyenas and Bears.....101
Lions, Leopards and Lesser Cats.....68
Other Mammals 107
Primates 93
Reptiles.....124

Maps

Bandhavgarh 255
Bardia.....210
Chitwan 203
Corbett.....188
Dachigam 180
Dudhwa 197
Gir 242
India .....Back Flap
India, Nepal and Sri Lanka Wildlife Parks.....Front Flap
Kanha 246
Kaziranga.....216
Keoladeo Ghana (Bharatpur).....225
Manas.....219
Nagarahole–Bandipur–Mudumalai.....260
Periyar 274
Ranthambore 233
Ruhuna (Yala) 290
Sariska 237
Sri Lanka 282
Wilpattu 286

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ABOUT THIS BOOK

This guidebook combines the interests and enthusiasms of two of the world's best-known information providers: Insight Guides, whose range of titles has set the standard for visual travel guides since 1970, and Discovery Channel, the world's premier source of nonfiction television programming.

The editors of Insight Guides provide both practical advice and general understanding about a destination's history, culture, institutions and people. Discovery Channel and its website, www.discovery.com, help millions of viewers explore their world from the comfort of their own home and also encourage them to explore it first-hand.

Israel

The editorial team for this book consists of experienced Insight Guide editors **Samuel Israel**, **Toby Sinclair**, and **Bikram Grewal**.

Sinclair

The two major parks in Nepal, Chitwan and Bardia are covered by **K. K. Gurung**.

Sri Lanka is dealt with by **Ravindralal Anthonis**. Anthonis is Honorary General Secretary of the Wildlife and Nature Protection Society of Sri Lanka and has served on several official committees concerned with wildlife and conservation in the country.

Grewal

Dr Kamala Seshan, geographer on the staff of the National Council of Educational Research and Training, New Delhi, opens this guide with a survey of physical and climatic conditions governing the distribution of animals and birds on the subcontinent.

Royina Grewal, writer on travel and matters cultural, and in charge of research for *Sanctuary*, India's leading journal devoted to wildlife and conservation, discusses traditional regional attitudes to and beliefs about wild animals.

Bittu Sahgal, editor of *Sanctuary*, producer of wildlife films, wildlife photographer and treasurer of the Bombay National History Society, freely gave his time and knowledge in assisting the editors and also placed the excellent Sanctuary Picture Library at their disposal.

Kaushalya Ramdas teaches at the Centre for Cultural Resources & Training in Delhi. In addition to her article on the forest regions

of the Indian subcontinent, Ramdas also wrote about some of the mammal species.

H. S. Panwar is currently Director of the India Wildlife Institute, Dehra Dun. He is well suited to write authoritatively about the glory of the tiger and also about Kanha, one of its major homes in India.

J. C. Daniel wrote the chapter on Lions, Leopards and Lesser Cats. This veteran Indian naturalist has been active in the field for 35 years and more. Currently Curator, Bombay Natural History Society, he is one of the editors of its journal and author of some 50 scientific papers on a range of subjects.

Dr D. K. Lahiri Choudhury has combined his duties as Professor and Head of the Department of English at Rabindra Bharati University in West Bengal with years of study of the Asian Elephant on which he has written extensively.

Dr M. K. Ranjitsinh who contributed the section on Deer, Antelopes and Bovines, is a senior Indian administrator who is currently Joint Secretary to the Govt. of India in the Dept. of Environment, Forest & Wildlife in the Ministry of Environment and Forests.

Kunal Verma, who wrote on Primates; The Dog Family, Hyenas and Bears; and on Kaziranga and Manas National Park, is a young journalist who divides his time between writing general interest features for the Associated Press, and wildlife-related articles for *Sanctuary* and other magazines, and wildlife photography and film-making with Sanctuary Films.

Rom and **Zai Whitaker** co-authored the section on Reptiles. Rom is the founder of three major institutions concerned with reptiles, the Madras Snake Park, the Madras Crocodile Bank, and the Irula Snakecatchers Co-operative.

Zai's father, **Zafar Futehally** one of India's leading ornithologists, contributed both the general introduction to the birds of the subcontinent and also a handy reference guide to those most frequently seen by the visitor.

Kailash Sankhala has led expeditions to the salt desert of the Rann of Kutch, the icy desert of Ladakh and the sandy desert of the Thar, the Great Indian Desert.

Dr E. G. Silas is senior Indian marine biologist. He has participated in several national and international fishery and oceanographic expeditions.

Joanna Van Gruisen has lived in Sri Lanka, Nepal and India since 1978, working first as a wildlife photographer and later also as cinematographer.

As Honorary Warden, Corbett National Park and as the producer of a film on the park, natural-history consultant **Brijendra Singh** is well-qualified to present it to readers of this guide. He, like a number of other conservationists, started as a hunter and has in recent years trapped (not killed) three man-eating tigers and one man-eating leopard.

In the case of Dudhwa National Park, we are fortunate to have an article by **Arjan Singh**, the person who was almost single-handedly responsible for getting it established and who has been associated with its development ever since. In recognition of his pioneering work, he was awarded the WWF International Gold Medal for1976.

Gillian Wright has been based in India for several years, working as a researcher for TV documentaries. She collaborated with Mark Tully and Satish Jacob of the BBC in the writing of *Amritsar: Mrs Gandhi's Last Battle*. She is a regular visitor to the Keoladeo and Bandhavgarh National Parks about which she writes with intimate knowledge and great sensitivity.

Divyabhanusinh is one of India's talented wildlife amateurs whose knowledge and authority in the field matches those of the professionals. As a life member of the Bombay National History Society, he served on its governing body from 1977 to 1982. Ranthambhore, Sariska and Gir are parks he knows intimately.

Ullas Karanth is a graduate in mechanical engineering who, after seven years as an engineer, switched to agricultural/forestry farming and then, in 1984, to wildlife studies as a profession instead of as the hobby it had been. Karanth is now Research Officer at the Centre for Wildlife Studies, Mysore and is well-equipped to write on Nagarahole and Bandipur National Parks.

CONTENTS

History

15 A Rich Array

19 Wildlife of the Indian Subcontinent
—by Bittu Sahgal

30 Animals in Mythology, Art and Folklore
—by Royina Grewal

39 Observing Wildlife
—by K. K. Gurung

Features

49 The Forests
—by Kaushalya Ramdas

59 The Tiger
—by H. S. Panwar

68 Lions, Leopards and Lesser Cats
—by J. C. Daniel

75 The Asian Elephant
—by D. K. Lahiri Choudhury

79 The Indian Rhinoceros
—by K. K. Gurung

83 Deer, Antelope and Bovines
—by M. K. Ranjitsinh

93 Primates
—by Kunal Verma

101 The Dog Family, Hyenas and Bears
—by Kunal Verma

107 Some Other Mammals
—by Kaushalya Ramdas

124 Reptiles
—by Rom and Zai Whitaker

133 Birds, Resident and Migrant
—by Zafar Futehally

149 Wildlife of the Himalaya
—by Joanna Van Gruisen

155 Wildlife of the Indian Desert
—by Kailash Sankhala

163 Marine Life
—by E. G. Silas

Parks & Sanctuaries

179 Dachigam National Park
—by Joanna Van Gruisen

187 Corbett National Park
—by Brijendra Singh

196 Dudhwa National Park
—by Arjan Singh

202 Royal Chitwan National Park
209 Royal Bardia Wildlife Reserve
—by K. K. Gurung

215 Kaziranga National Park
218 Manas Tiger Reserve
—by Kunal Verma

225 Keoladeo Ghana National Park
—by Gillian Wright

233 Ranthambhore National Park
236 Sariska Tiger Reserve
241 Gir National Park and Sanctuary
—by Divyabhanusinh

246 Kanha National Park
—by H. S. Panwar

253 Bandhavgarh National Park
—by Gillian Wright

259 Nagarahole and Bandipur National Park
—by Ullas Karanth

268 Mudumalai, "Ancient Hill Range"
—by Toby Sinclair

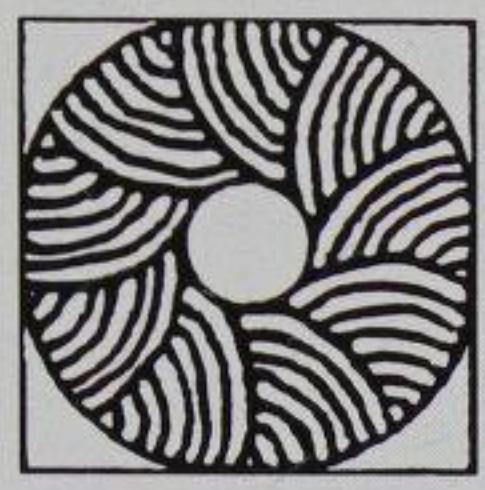
273 Picturesque Periyar
—by Zai Whitaker

283 Sri Lanka's Untamed Treasures
285 Wilpattu National Park
288 Yala National Park
293 Sri Lanka's National Parks
—by Ravindralal Anthonis

Maps

180 Dachigam National Park
188 Corbett National Park
197 Dudhwa National Park
203 Royal Chitwan National Park
210 Bardia Wildlife Reserve
216 Kaziranga National Park
219 Manas Tiger Reserve
225 Keoladeo National Park (Bharatpur)
233 Ranthambhore National Park
237 Sariska Tiger Reserve
242 Gir National Park and Sanctuary
246 Kanha National Park
255 Bandhavgarh National Park
260 Nagarahole-Bandipur-Mudumalai
274 Periyar Tiger Reserve
282 Sri Lanka
286 Wilpattu National Park
290 Ruhuna National Park

TRAVEL TIPS



298 *Getting Acquainted*

301 *Planning the Trip*

305 *Practical Tips*

309 *Getting Around*

312 *Wildlife Parks*

340 *Language*

343 *Further Reading*

349 *Index*

For detailed Information
See Page 297

A Rich Array

This guide is planned to serve a dual purpose: to acquaint the reader/user with the wildlife picture in the region it covers, and to provide a practical guide for visitors making a wildlife tour of the region, both at the planning stage and then on the ground during the tour itself.

The first part of the guide that immediately follows therefore provides the broad background in which the region's wildlife lives and can be observed; the current wildlife situation and prospects in the light of local attitudes and traditions; and an eminently practical article on the art and practice of observing wildlife.

India, Nepal and Sri Lanka have much in common, but also a fascinating diversity; and in the case of India, a rich diversity even within its national frontiers. Though so close to the tip of the Indian peninsula, Sri Lanka, thanks to the narrow strip of ocean between the two countries, has some unique features in terms of nature of habitat and species. Even among birds that have the capacity to fly over the narrow Palk Strait, while many are common to both countries, some, from either side, just refuse to cross.

This guide presents this diversity in broad spectrum. The tiger, the elephant and the unique Indian rhinoceros get separate treatment, as also the very special Himalayan and desert habitats. Others are grouped for coverage under headings such as Primates, Birds, Reptiles etc.

Preceding pages: tiger; radio-tracking tiger, Nepal; monsoon in Nepal *terai*; blackbucks, Gujarat; painted storks, Bharatpur. Left, Langtang river, Nepal.

WILDLIFE OF THE INDIAN SUBCONTINENT

Deep in the jungle gloom a striped predator lurks. Programed by instincts genetically implanted millions of years ago, the cat waits patiently for a herd of spotted deer to make their way through tall grass towards a nearby water hole. Barely one in 10 attempts to kill will be successful, but because of sheer persistence, such odds work in favor of the hunter. Contrary to popular belief, success depends less on speed and power, more on stealth and ambush. In all probability a young, weak or careless deer will fall prey to the tiger. The fascinating drama between predator and prey has gone on uninterrupted for years and has been responsible for the perfection in nature that so moves and inspires us.

Rich diversity: Unique, still mysterious, and forever fascinating, the natural history of the Indian subcontinent remains largely unstudied and its natural wealth little appreciated. Geological events that took place millions of years ago created an incomparable diversity of ecosystems. In the north the legendary snow-capped Himalayan ranges house rare and elusive creatures such as snow leopard, musk deer, ibex and pheasants of all descriptions. The Thar, also called the Great Indian Desert, sprawls between India and Pakistan in the northwest and supports a surprising variety of hardy plants and animals, several found nowhere else on earth. Towards the east, bordering Bhutan, Bangladesh and Burma, cloud forests and swamps shelter life forms ranging from tigers, elephants, rhinos and gibbons to the largest moth and some of the rarest orchids in the world. The lower slopes and foothills of the Himalaya, clothed in verdant coniferous forests and grasslands, are the last refuge of several endangered plant and animal species.

The great floodplains of the Indus, Ganga and Brahmaputra rivers, though radically altered by man's agricultural lifestyle, are still among the most fertile areas in the world. The Western Ghats, an ancient chain of hills running from north to south, fringing the western coast of India, are perhaps the last hope for some of Asia's densest rainforests. In the scrub and grasslands of the Deccan Plateau, naturalists have recently rediscovered Jerdon's double-branded courser, a ground bird that was presumed extinct for nearly 80 years. Running all along the peninsula's coastline are some of the world's finest and most indiscriminately exploited coral formations, sand bars and mangroves. Off the southern tip of India, Sri Lankan forests thrive even as they provide naturalists with several fascinating pointers towards the evolution of life on earth. That leopards managed to colonize Sri Lanka, for instance, while tigers never reached its shores, indicates that the island separated from the Asian mainland before the spread of the tiger from Central Asia to the north Indian plains. Many unanswered questions, however, still lie hidden in the mists of prehistory, wrapped in the many marvels and mysteries of the natural world.

Mughal Emperor Akbar hunting, from the 16th-century *Arbar Nama*. Previous page: tiger at Ranthambore.

Eden besieged: For many years, Africa has been regarded as the destination for wildlife spotting, and justifiably so. However, in recent years the natural wealth of the Indian subcontinent has begun to offer naturalists, tourists and researchers a fascinating alternative to that of Africa. Tropical Asia, after all, probably houses the richest diversity of life forms on the face of the earth. And the Indian peninsula might well be considered the cornerstone of this Eden – an Eden, unfortunately, under siege from one-fifth of humanity.

In 1271, a young adventurer departed from his native Venice on a voyage of discovery. Among the other incredible stories he related in his "Book of Marvels," he spoke of a wondrous land filled with curious animals, like elephants, rhinos and great striped cats. That land was India. The man was Marco Polo. Incredibly, more than a thousand years before Marco Polo discovered the riches of India, Emperor Ashoka, who then ruled most of this vast region, had realized the value of its natural wealth and passed edicts to protect it. But that was still an age when people had need to "conquer" nature to carve an acceptable niche for himself in a hostile world. Yet, somehow, the awe and respect for natural systems, on which the very existence of the Indian people has always been dependent, prevailed. Animals have always played an important role in the daily lives of Indians. Regional mythology, religion and even social mores are entwined with rituals that involve the deification of plants, animals and the elements.

It was only when the British took over the subcontinent that development first began to take a serious toll. Vast Burmese teak forests were razed to fabricate ships and homes for the Empire. Countless natural habitats were destroyed to obtain valuable cash crops such as tea and cotton. The land was ripe for the taking and had never really been managed. Quite obviously, neither was it left to its own excellent devices as it had been for millions of years. The exploitation had begun in earnest.

Those who fervently hoped that independence would reverse the trend towards poor land-use were mistaken. After 1947 the face of the Indian

subcontinent began to undergo its most drastic change. The people were poor, and for the most part there was a genuine desire on the part of their leaders to provide the people with a better standard of living. The only freely available commodity was land. No one thought of the disastrous consequences of converting wild grasslands and forests to pastures or industrial dumpyards. India, Pakistan, Bangladesh, Nepal and Sri Lanka are all currently reeling under the stress of shortsighted past decisions. And, in spite of knowing better, today's managers often continue to opt for minor political gains, using land as a tragic medium of barter to appease an unknowing people. The resultant havoc caused by nature's response to bad land-management – floods, droughts and famines – is too well-known to merit further comment.

The fact that representative pockets of wild habitats survive on the subcontinent today has very little to do with people's realization of the worth of his natural heritage. Rather, credit is due to the inborn resilience of plants and animals that have evolved near-perfect survival techniques after living for millions of years in a hostile environment. To understand how blessed the region once was, one needs merely travel to reserves such as Kanha or Bandhavgarh in Madhya Pradesh, Ranthambhore in Rajasthan, Manas in Assam, Chitwan in Nepal, Wilpattu in Sri Lanka, and the Sunderbans in West Bengal. At one time the entire subcontinent was as rich and productive as these oases of restraint and tolerance.

In such havens, the sight of thriving ecosystems provides a glimpse into the way things were, before the evolution of man. The profusion of life is truly staggering as lianas, vines, fungi and animals of every description are seen living out their threatened existences, oblivious of the inexorable press of humanity around them. These isolated green vaults are now zealously protected as a result of our newly awakened understanding of the consequences of environmental imbalances. But for vast areas it is already too late. The malaise has taken a firm grip of the land and many once-verdant expanses have forever been reduced to dust.

What is likely to strike most visitors to the many reserves in the region is the stark contrast between the outside and inside of protected places. Almost without exception, the approach roads are barren and, often, a sense of apprehension creeps in, as you begin to wonder what lies in store. The moment you enter, say, the Periyar Tiger Reserve, however, the apprehension vanishes as you are transported to a primeval peace so familiar to anyone whose soul is stirred by the outdoors.

Stripes and ivory: But there is a fundamental difference between the wildlife experience of Indian jungle and that found in Africa. To begin with, tropical jungles are dense and most often visibility is fairly restricted. All too often visitors, lured to India by tourist brochures that promise exciting "tiger safaris" are disappointed to see fewer animals than they expected. It's not that the surviving jungles are thinly populated, but that most creatures, which have mastered the art of camouflage and deception over millennia, are

virtually impossibly to spot unless you know what to look for. With the help of an experienced guide, however, a moving twig becomes a praying mantis, part of a tree stump takes wing to reveal itself as a roosting nightjar, or, with some luck, an imperceptible movement in the grass turns out to be none other than a tiger.

At one time "tigerland" comprised virtually the whole Indian subcontinent. Fearing no animal, the great cats colonized every imaginable habitat, from the lower slopes of high mountains, to desertified scrub lands, rainforests and swamps. Positioned at the apex of the foot chain, tigers managed to carve a secure niche for themselves while still allowing adaptable predators such as the leopard and several lesser cats to co-exist. With the arrival of *Homo sapiens* all this changed. Having learned to alter the environment to suit

Death of the man eater.

their own convenience, they began to make inroads into virgin jungles, slashing and burning in their frantic haste to convert hostile habitats into hospitable havens.

Over a period of time, having established dominion over the natural world, humans began to hunt for pleasure. Persecuted for their skin and for the illusion of bravery surrounding shikar, tigers reacted by altering their lifestyle. The once-proud predators that hunted by day, turned to the security of nocturnal life to avoid humans. As the number of people began to swell, the tiger retreated deeper into the jungle. Many of the other animals that shared the tiger's domain did the same.

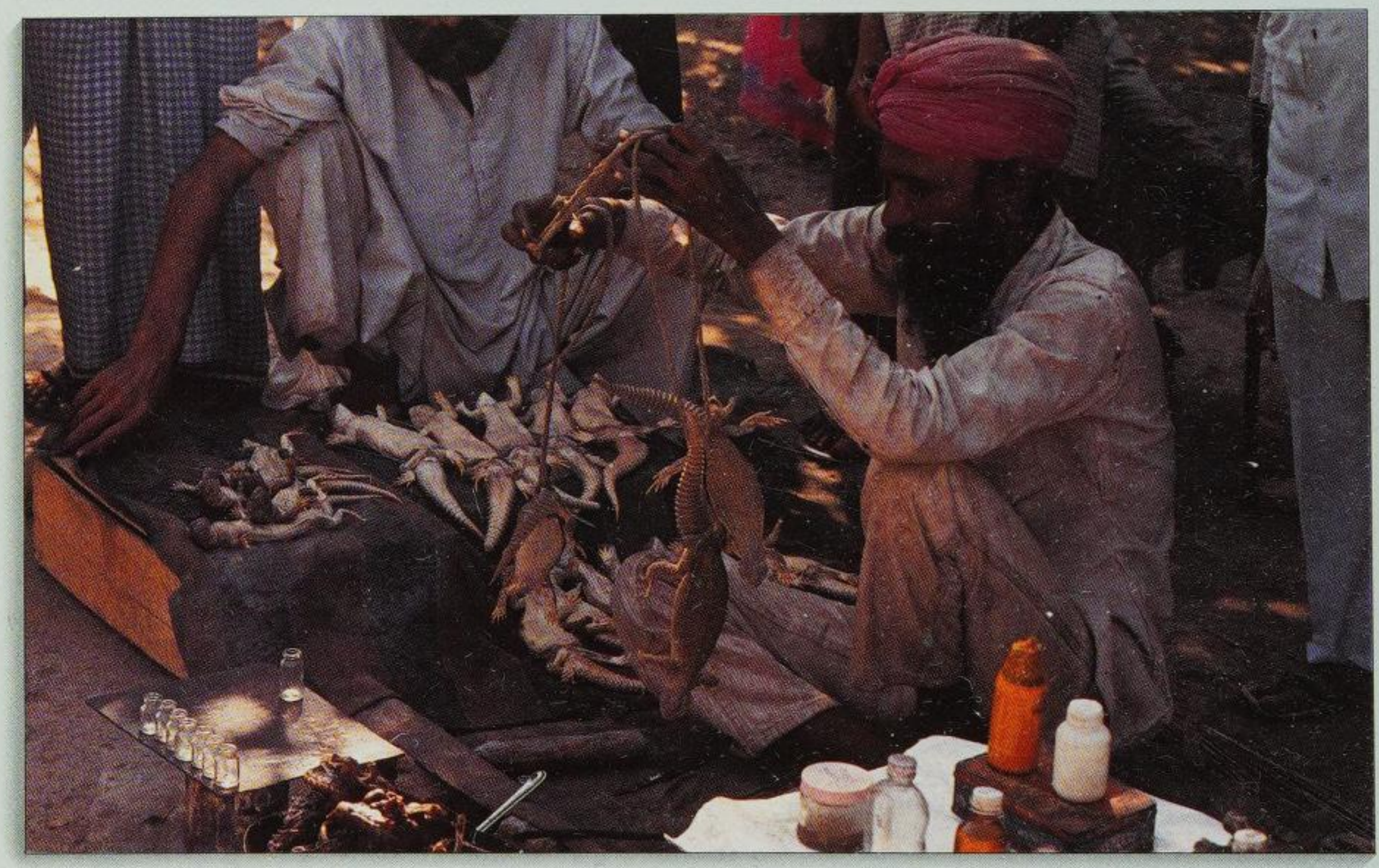
Elephants, perhaps more than any other animal, typify the man-animal conflict in India. The large beasts require vast ranges in order to survive. Their daily requirement of green fodder can exceed 450 lb (200 kg) per day. Plantations, hydroelectric projects and jungle clearances have so totally fragmented their habitats that elephants, which once roamed virtually contiguous forests, must now contend with existence in small pockets, and when they do try to migrate to distant pastures they come into conflict with man, most often with disastrous results for both. The problem of habitat degradation is compounded by man's ancient yearning for ivory. Even today, despite stringent laws, elephants regularly fall victim to poachers who often use poison and pit traps to bring down their quarry, wiping out entire families.

Left, end of a shoot, 1935, Chitwan, Nepal. Above, late 19-century shoot, united Provinces.

Conservation: Fortunately, in recent years, the Indian government has taken a more progressive attitude towards the protection of wild animals. There is no doubt that execution still lags far behind intention; however, as a policy, the authorities have come down hard on known traders, poachers and exploiters. Consequently, India is probably the last hope of survival for the one-horned rhino, the great Indian bustard, the gharial (a fish-eating crocodile) and a host of other highly endangered species, many endemic to the subcontinent. Moreover, recognizing that knowledge is the first step towards protection, sterling organizations such as the Bombay Natural History Society (BHNS) are being partially funded by the government to carry out field natural-history

projects to evolve management strategies for wild habitats.

Through such pioneering efforts the strands of relationships between life forms and the habitats they live in are slowly being pieced together. Avifauna and hydrobiological studies are helping us to understand the critical needs of birds that migrate to the subcontinent from distant nesting grounds in Siberia, Afghanistan, Tibet and China. The thriving wintering grounds of such birds, like Rajasthan's famous Keoladeo Ghana National Park (Bharatpur) and Tamil Nadu's Point Calimere Sanctuary, where the BNHS has permanent research stations, are fine testimonials to well-executed conservation plans. In the ethereal atmosphere of these wilderness areas it is easy to forget the ecological problems that beset the subcontinent as a whole.



Wildlife and tourism: There is no doubt about it. Natural India awaits discovery. Despite the lack of an extensive tourist infrastructure, the heat and humidity, people are drawn back to the forests that Kipling immortalized. In any event, the secret for visitors lies in knowing what to expect and in understanding that the privilege of stepping into a pure and untouched world is a reward in itself. Actual animal sightings, fortunately on the increase each day as protection lends security to once shy creatures, must be viewed as a lucky bonus.

Recognizing the tourist potential of wildlife, the governments of India, Nepal and Sri Lanka have gone out of their way to cater to the basic requirements of nature lovers. From Kashmir and Ladakh, through the Garhwal Himalaya and eastwards to Assam, organized treks, river rafting and wildlife viewing facilities are emerging, as private and government agencies gear up to meet the new influx of adventure-seekers from all over the world. The Royal Chitwan National Park in Nepal has become a routine stopover for all categories of tourists. Here, in fact, the lodgings have shown how easy it is to capitalize on the simple joys of nature. Visitors are given very basic but well-designed creature comforts and the rest is left to nature. Excursions into the forest are arranged on elephant back, one of the most satisfying and effective ways to view animals such as the great one-horned rhino and the tiger. Trained guides and four-wheel drive vehicles are also on hand to help visitors to get a "feel" of the habitat in the shortest possible time. Varying degrees of creature comforts are available in virtually every wilderness of India. And, in some of the more remote locations, where comforts fall short, the basic hospitality of locals can be depended upon for a simple meal and a place to bunk down. One need be armed with little more than mosquito repellents, water purification tablets, a sleeping bag and a basic love for nature.

These trends towards wildlife tourism, domestic and foreign, are to be welcomed, for there is no better way to communicate the worth of a country's natural wealth than to allow others to experience it first-hand.

The question conservationists and naturalists are asking today, however, is whether our besieged natural areas can withstand the trauma of

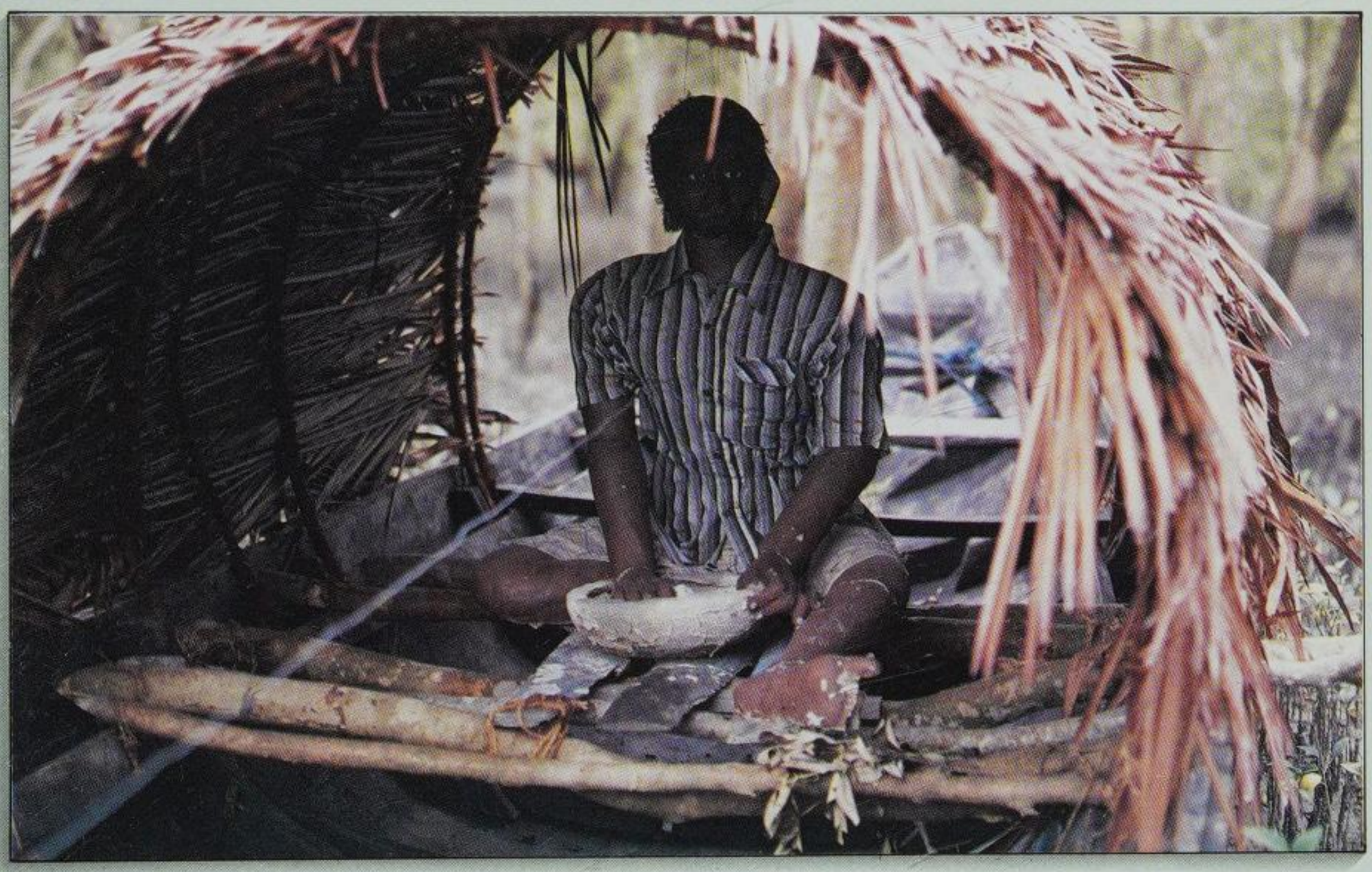
uncontrolled tourism. Though sometimes exaggerated, such fears are often well founded. Consider the plans that were slated for the exquisite islands of Lakshadweep some 124–249 miles (200–400 km) west of the Kerala coast. Terms such as "tropical island paradise" are wholly inadequate when describing the pristinity of such areas. To cater for and exploit the tourist potential of the coral formations, some misguided enthusiasts have suggested that a channel be blasted through the ring of corals to admit large ships capable of carrying thousands of tourists. The resultant death of living corals, as unfettered tides pour sand on the reefs, would have caused the ecosystem to be destroyed within a decade – fortunately this plan seems to have been shelved. Some well-advertized treks to the mountains are no better. The Valley of Flowers and the Nanda Devi Sanctuary in the Himalaya have suffered more on account of uncontrolled tourism and indisciplined mountaineering expeditions than any other single cause.

As usual, only a few unscrupulous groups give tourism a bad name. To counter such problems, rigid controls, such as trekking permits in Nepal and supervised excursions into Indian national parks and sanctuaries, were introduced some time ago, largely at the behest of enlightened mountaineers and wildlife tour operators. Nevertheless, short-term objectives still often need to be contended with.

Conflicting policies: Examples of environmental bankruptcy are even more rampant outside the corridors of tourism. In Kerala the state government spends at least Rs. 400 crores ($3.5 million) a year to prevent shore erosion. Yet mangrove trees and coral reefs, nature's erosion barriers, continue to be brutalized in the name of industrial development. In Rajasthan the animal husbandry department busily distributes goats and sheep in villages where the social forestry department distributes saplings. The result? No saplings and, eventually, no goats and sheep either! The animals consume all available fodder in sight and are soon sold for their meat when they start damaging croplands.

As the list of such absurdities grows, the effects take on more sinister dimensions. In Madhya Pradesh for instance, even in the face of continued opposition from local and international bodies, the Narmada dam projects threaten to inundate vast areas of land, much of which continues to support viable populations of endangered species. In the process of siphoning power for distant industries, thousands of Adivasi people and local villagers will also be displaced. They will then have to be "resettled" in camps, to become a permanent drain on the exchequer.

Saving the land: With so many different languages, it is almost impossible to communicate conservation's universal message without distortion. "In a land where people are dying," say some naive (and some not so naive) politicians,



Left, spiny lizards about to be cooked to extract "medicinal" oil. Above, electrified dummy to discourage man-eating tigers, Sunderbans, West Bengal.

social workers and businesspeople, "they want to save forests and animals!" But the people of the subcontinent are as directly dependent on the health of the land as the birds and animals of the forest. Saving the land is saving the people. And we cannot save wild habitats without saving the gardeners of our Eden. Once this reality is accepted, everything else will follow.

This then is the region – bountiful lands occupied by hard-pressed people. Fortunately, however, signs of renewed awareness are emerging. Slowly, very slowly, opposition to environmentally ill-advised plans is mounting – two classic examples being the saving of Silent Valley's rainforest in Kerala from the jaws of a hydroelectric project, and the famous "Chipko" movement, where women in the Garhwal Himalaya prevented contractors from exploiting already degraded forestlands. Other successes, such as the protection of nests of the rare black-necked crane, the declaration of Pirotan as India's first marine national park and the increase in sightings of the great Indian bustard, speak volumes for the resolve of forest officers and their staff who must often place their lives at risk in the course of their work. With increasing frequency, enlightened public figures have also begun making their views on the degradation of the environment known. At the behest of the Prime Minister of India, an ambitious wasteland development progam has been instituted and plans to cleanse the Ganga of its chemical and organic pollutants are under way. The race to restore sanity and save the land is on.

Project Tiger: In retrospect, the turning point for Indian conservation was probably the forced acceptance in the late 1960s that the tiger was destined for extinction. Following an international appeal to save one of the world's most magnificent beasts, Project Tiger was launched in 1972. The first step was to abolish tiger shikar (hunting). The second was to save its vanishing home. Choosing habitats as far removed from each other as the Sunderbans in Bengal, Corbett in U.P., and Periyar in Kerala, the authorities decided that the only long-term way to save the tiger was to save its forest. In the process, innumerable other animals received protection, including the Asian elephant and the great Indian one-horned rhinoceros. Since 50 percent of the Project's funds were met by the Central Government, the states were able to protect tiger reserves better

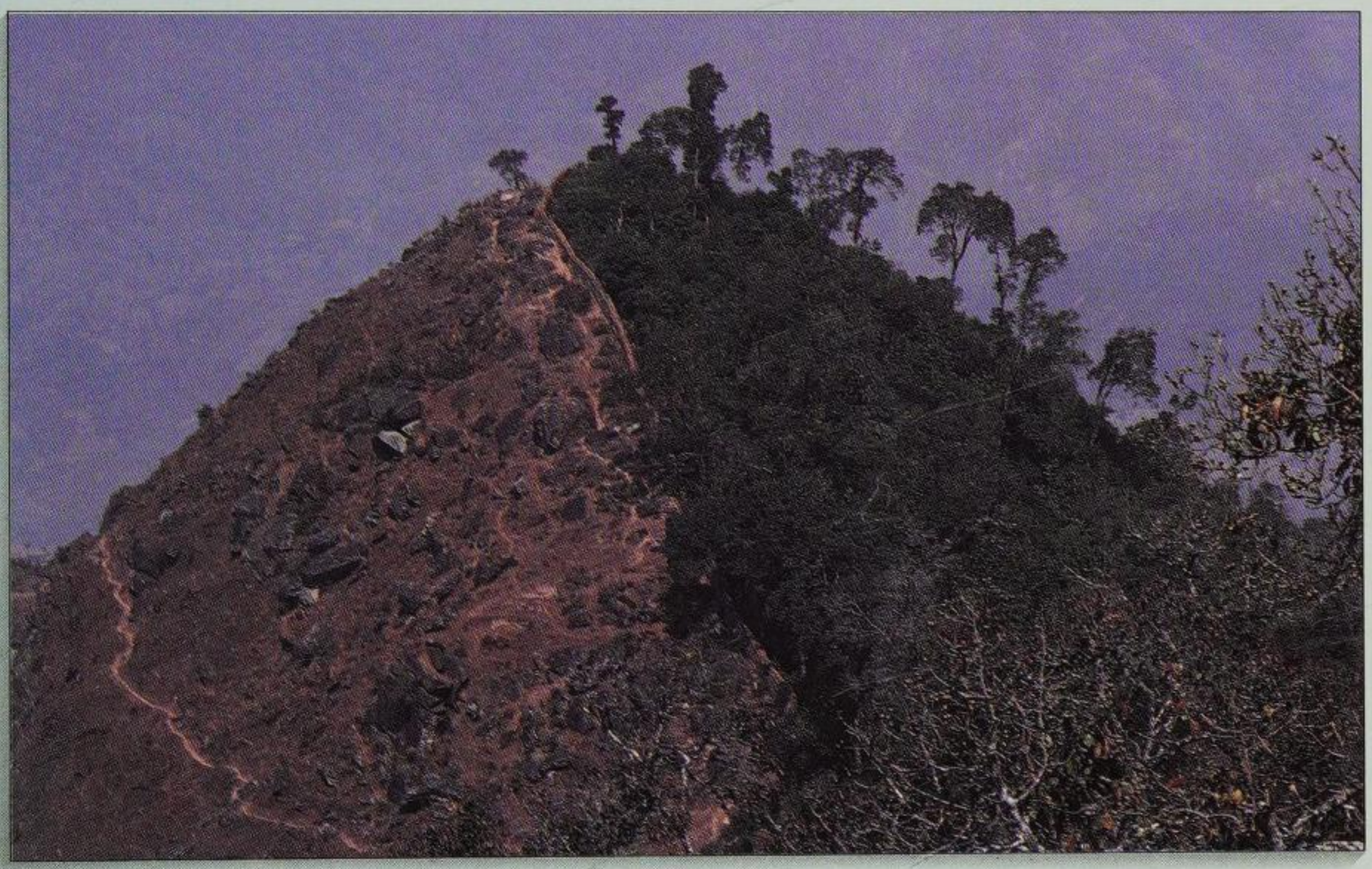
than ever before and, initially, the results were there for all to see. The presence of the tiger in its chosen habitat indicates that the ecosystem is vibrant and the number of tigers in Indian jungles increased from less than 2000 in the early 1970s to 4005 in 1986. Dry deciduous habitats such as Ranthambhore and Sariska have received a new lease on life. The hard ground barasingha of Kanha have recouped their dwindling numbers. In Manas, Assam, a score and more endangered animals such as the hispid hare and the pygmy hog have been retrieved from the brink of extinction. No one can even begin to estimate the number of plants and invertebrates that have been saved within the 15 tiger reserves. However, in recent years the numbers have fallen considerably and at

the last survey there were less than 2,500 tigers left in the wild. Much of the decline is due to poaching to satisfy demand for tiger parts from East Asia. Unless concerted action is taken to combat this threat – and this means funds and commitment from central and state governments – the tiger will soon be extinct in India.

Local pressures: Despite increased awareness, the rate at which the overall forest acreage is dwindling is nothing short of alarming. Domestic and industrial wood consumption far exceeds the regeneration capacity of existing forests. At the turn of the century a full 40 percent of the subcontinent was under natural cover. Satellite pictures indicate we are now down to less than seven or eight percent. And "developers" seem unable to answer the straightforward question conservationists ask: "If we cannot look after and protect even eight percent of our land, what chance of survival can there be for the remaining 92 percent?"

With no other resources, villagers now turn to forests to meet their daily requirements of fuel and fodder. To win elections, politicians often make unrealistic promises to their electorate, thus creating friction between park managers and local people. Another major problem, of course, is that of human-animal conflicts. Cattle lifting, crop destruction and occasional man killing incidents are genuine and very serious problems, but incidents are often blown out of all proportion and a frenzy is whipped up to pressure the authorities into giving in to the demands of the local people.

In Dachigam, Kashmir, nomadic graziers called *bakarwals* ask vociferously whether the hangul, a highly endangered deer, is more useful to the people than their wool- and meat-bearing livestock. In Dudhwa, U.P., farmers cry themselves hoarse for the blood of tigers. In Bharatpur, Rajasthan, villagers cannot understand why water is diverted for wild birds which raid their crops when their own fields are parched. In Orissa fishermen are dumbfounded by laws that protect turtles, only to let them return in their millions to the open sea. In Assam, tea estate owners still occasionally shoot elephants to protect their cash crops. In Gir, the last 200 lions are constantly under threat from Maldharis who poison them in retaliation for cattle lifting.



Left, hill women returning with a day's collection of fuelwood. Above, contrast between unprotected and protected forest, Kathmandu Valley, Nepal.

Conservationists have come to the conclusion that the way to reduce such hostility on the periphery of protected places is to improve the socio-economic standards of people who fringe forests. This, however, is easier said than done. Attempts to introduce stall feeding of cattle, or to improve their bloodstock have failed because there is simply no spare cash available for even the smallest investment. Even plans for the large-scale introduction of new, smokeless *chulas* (ovens), which can reduce a household's fuel consumption by over 30 percent, did not work, because villagers are unable to meet the cost of the *chula*.

Meanwhile, rural women are forced to walk more than 1,000 miles (1,600 km) each year in

search of head loads of wood; after over 50 years of independence, India has still not hammered out a national fuel wood policy. Consequently, 50 percent of the domestic fires in some of the country's largest cities are fed by wood. Even as sporadic social forestry efforts meet with success, natural forests are literally being transported to the cities to vanish in smoke.

Hopeful signs: The Indian subcontinent's wildlife and its fledgling conservation movement may be set for a renewal and, in spite of several setbacks and hurdles, there a few reasons to feel optimistic for the future. A major contributive factor has been the credibility of the press, which pitched its considerable might behind the efforts of rational conservationists in the past few years. Although the government-controlled television network also responded admirably, and promised

to deliver conservation education directly to millions of people, this plan was scuppered by the deregulation of broadcasting and the introduction of satellite and cable TV.

Meanwhile the forests of the subcontinent offer unique opportunities of escape from the pressures of urban living to adventure-seekers from all over the world. At last, at least for tourists, the gun has been replaced by the camera: there was no way that wildlife could have survived the crossfire between habitat destruction and *shikar*. However, before condeming all previous practices, it would be wise to remember that several existing parks and sanctuaries have survived the plow and ax only because they were once protected as hunting preserves by influential hunters, including maharajas and viceroys, in years gone by.

Today, for the benefit of tourists, orientation centers maintained by qualified and experienced staff, have been set up in the more prominent parks such as Chitwan, Kanha, Corbett and Bharatpur. Here, with the help of audio-visual aids, it is ensured that visitors have meaningful nature experiences, while simultaneously promoting compatibility between the objectives of conservation and tourism. With such a wide variety of habitats to choose from on the subcontinent, tourists can tailor their experiences to suit individual needs. They can also pack diverse experiences into relatively short trips. Where else in the world, after all, could a person travel from snow leopard and ibex country (Ladakh), to a hot desert (Thar), to a coral paradise (Pirotan), to savannah grasslands (the *terai*), to deciduous forests (Bandhavgarh), to mangrove swamps (Sunderbans), to a rainforest (Silent Valley) – all without crossing a single international boundary?

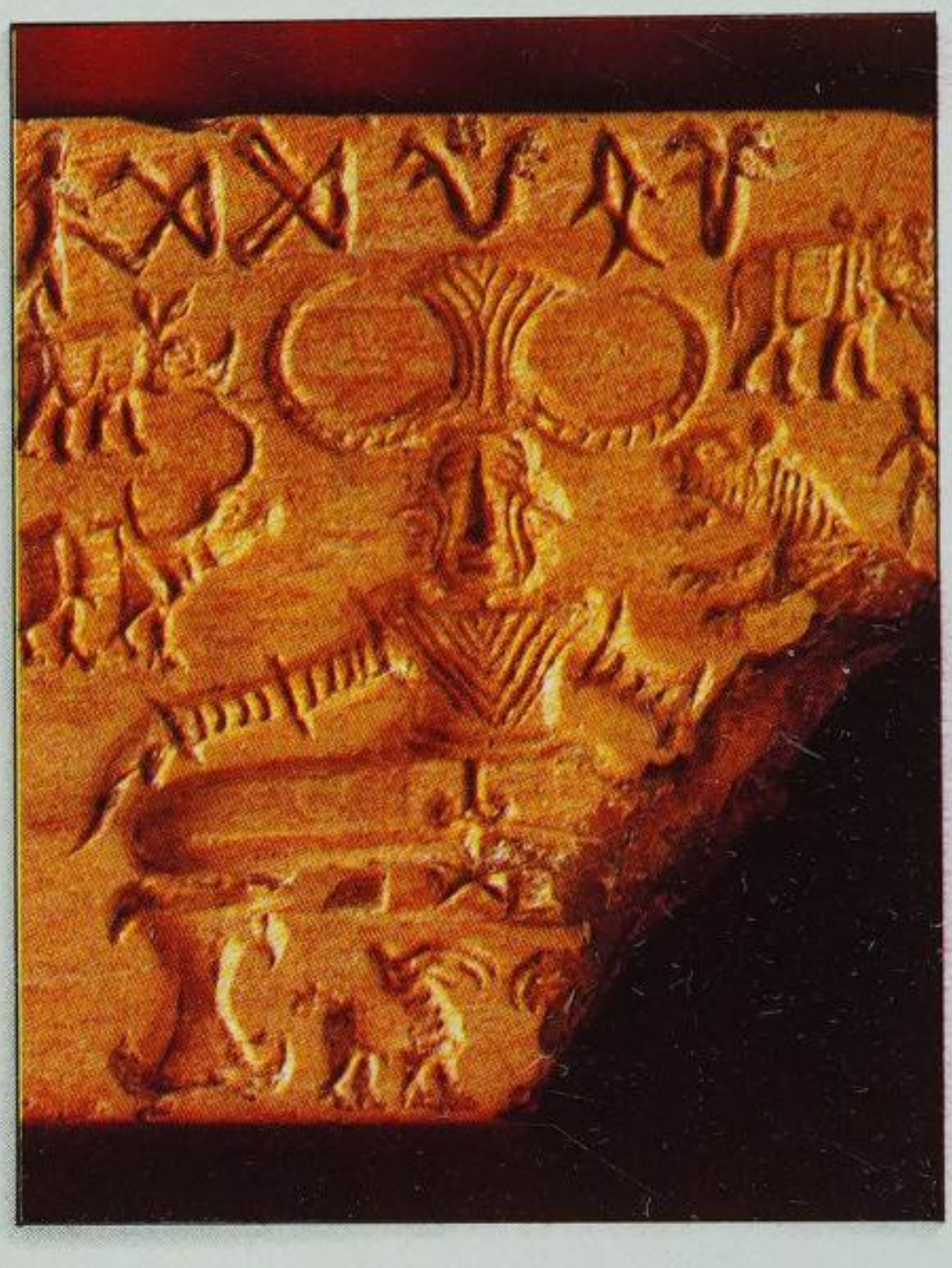
As the deer and the tiger play out their destinies in the forests of the night, an onerous burden falls on humans, the newest animal of all. Our past misdeeds and position of power has led us to assume the responsibility of guards to nature's domain. Whether the earth and its bounty survive our irresponsibility and inexperienced stewardship, only time will tell.

Above, hoardings at the entrance to Kanha National Park, Madhya Pradesh. Right, lichen-draped rhododendron forest, central Nepal.

ANIMALS IN MYTHOLOGY, ART AND FOLKLORE

Seldom has any culture been so deeply and so consistently associated with animals and trees as that of Hinduism and Buddhism, which are shared by India, Nepal and Sri Lanka. Religious belief, mythology and folklore combined to invest the animals with a sanctity that was reiterated throughout history and endures even today. This was the basis for the continued abundance of artistic representation and this brought to the depiction of animals a range of significance and association that encompassed the diversity of Indian culture.

Traditions of animal worship, thought to originate in the need to propitiate those that presented danger to or served humans, are strong, especially



in Adivasi areas, while other potent zoomorphic forms have been absorbed into the Vedic pantheon and ascribed varied degrees of consequence. Such was the apotheosis of animals that they were even woven into Buddhist and Jain myths.

The abiding sacredness of animals was rooted in a deep sense of identification. This was derived from the Hindu-Buddhist theory of transmigration, according to which the soul moves back and forth between different modes of existence – animal, human and suprahuman. This was extended by the corresponding belief that all forms of life partake equally in the universal life force, a belief that was reinforced by Buddhist and Jain teachings. These religions also introduced the concept of *ahimsa* (non-violence), prohibiting harm to living beings. Disparate beliefs coalesced. Animals in Hindu and Buddhist art became eloquent symbols, closely related to the cultures of the subcontinent. The cosmic zoo of Indian tradition, then, was presented with awe, reverence and empathy. The sacerdotal import of animal images dictated that the highest skills be brought to their depiction. Styles varying from the spontaneous vitality of early art, to the technically more complex art forms, were all distinguished by their excellence. This grew out of an understanding of the essential character and significance of the subject and a close familiarity with every nuance of movement and behavior of the animals depicted. Despite the adoption of iconographic conventions, a tremendous variety in presentation was achieved by individual craftsmen. Depictions varied from the highly stylized to the most naturalistic.

A prolific delineation of animals is to be seen on seals and other objects of the Harappan Culture (2,500 BC) centered on the Indus-Valley cities, Harappa and Mohenjadaro. Although the bull and elephant appear to have been particularly popular, the rhinoceros, tiger, antelope and a flying eagle with a snake in its talons were crafted with a skill that contrasts with the comparatively perfunctory execution of the human figure. A terracotta monkey or a faience squirrel, although without sacred connotations, were as cunningly carved as any icon.

With the arrival of the nomadic Central Asian peoples in *circa* 1,500 BC, the emphasis shifted to their anthropomorphic gods. The sanctity of animals was maintained through myths investing them with divine parentage. Brahma, the creator, himself assumed animal forms to beget the earth's creatures. His consort became a cow, he a bull, and from their union sprang horned cattle. Thus all manner of creatures were created. Other gods, demigods, and even demons also took on animal forms. The status of animals was enhanced in the mythology of Vishnu, the preserver, third member of the Hindu Triad in which he appears in incarnations *(avatars)*, once as a fish *(Matsya)*, once as a tortoise *(Kurma)*, and once as a boar *(Varaha)*, to save the world at various points in its precarious existence. Vishnu as a boar lifting the earth on his tushes is a favorite theme in art. A particularly fine example is the Udaygiri relief of around 400 AD.

Several ancient animal deities were also incorporated into the new pantheon. Half-animal and half-human deities evolved, melding old images with new gods. Ganesh, the elephant-headed god of wisdom and plenty, hailed as the remover of all

obstacles, is a major and exceedingly popular deity. He is invoked at the start of all rituals and before any major undertaking. He was absorbed into the mainstream of Hinduism as a son of Parvati, consort of Shiva, the destructive aspect of the Triad. Various myths developed to establish this relationship. The most common has it that the goddess formed Ganesh from her sweat and appointed him guardian of her chambers. When Shiva sought to enter, Ganesh, unaware of his identity, barred his way and was beheaded by the enraged god. Subsequently, Shiva promised to replace his severed head with that of the first creature he found, which was an elephant.

Other archaic animal deities were closely associated with major Hindu gods. The Naga or snake, a powerful symbol, became an important element in the iconography of both Shiva and Vishnu; images of the former prominently display a serpent around his neck. The latter is often depicted reclining on the endless coils of the serpent Ananta, upon whom, indeed, the world is said to rest. Krishna, a human incarnation of Vishnu, is regularly represented sheltered by the multiple hoods of the snake-demon Kaliya.

Sacred animals also became the mounts *(vahanas)* of various Hindu gods. Symbolizing or complementing the energy or character of the deity, they came to be integral to iconography and were always depicted with the deity. Among the early gods of the Central Asian peoples to receive mounts were Angi (fire) whose *vahana* was a goat. Varuna (water) naturally mounted on a crocodile, Vayu (wind) appropriately astride an antelope, and the Moon riding the heavens on a deer.

Carnivores, the dreaded enemy of humans and their cattle, came to be the mounts of the goddesses Durga and Kali. Their ferocity and strength was an obvious accessory to their destructive and demonic aspect and established their supreme power.

Herbivores on the other hand, were associated with male gods. Nandi, the bull, *vahana* of Shiva, reflected his legendary virility. Deer, consistently associated with Brahma, were also represented with Shiva who is frequently depicted holding a deer to signify his status as Pashupati, Lord of the Beasts. Vishnu soars above the earth on Garuda, the golden eagle-hawk, who is swifter than the wind and the sworn enemy of snakes. He has the head, wings and talons of a bird but the body of a man. A sense of power and strength is always evident in depictions of Garuda.

Brahma's mount is the *hamsa*, variously interpreted as a swan or goose. The bird was later also associated with Saraswati, the goddess of learning. Its veneration was believed to ensure success in every enterprise. Apart from its depiction with the deity, the *hamsa* also frequently adorns lamps, symbolizing the goddess's capacity to dispel the darkness of ignorance. Kartika, god of war, has a peacock for his *vahana.* This apparently incongruous relationship has been traced to the bird's

Preceding pages, the elusive gharial. Left, Harappan seal (2000 BC) depicting proto-Shiva as protector of animals. Above, Naga stones, Bansawara, Rajasthan.

formidable ability to destroy snakes. Indra, king of the lesser gods and lord of rain, rides the elephant Airavata. Also allied with Lakshmi, goddess of prosperity, elephants were frequently sculpted or painted pouring the "fertilizing waters of life" over her. Referred to as Gaja (elephant) Lakshmi, this motif, considered most auspicious, was widely represented.

The river goddesses, Ganga and Yamuna, were appropriately mounted on a tortoise and a crocodile respectively. The fish, symbol of fertility, as were all aquatic creatures, was related to the god of love, Kama, and often emblazoned on his banner. His consort, Rati (passion), was usually represented with a parrot. Commonly portrayed in erotic sculpture, this bird also indicated the mood of love. The demon Mahisasura, whom the male gods were unable to subdue – he was killed

by Durga – assumed the form of a buffalo.

Some animals acquired a semi-divine status in recognition of their noble qualities and faithful service to the epic hero and god-king Rama. Monkeys gained respect as constituting the army that helped Rama defeat the demon king of Lanka, Ravana. Hanuman, his langur general, renowned for loyalty and valor, is venerated as one of the seven immortal heroes. A celibate, he is also believed to have originated the custom of *mantra* repetition. Considered the master deity of all spirits, he is propitiated in exorcism rites still prevalent in rural India. In temples dedicated to Hanuman, the deity is represented as a brave warrior (Vira Hanuman) in various threatening stances, while in Rama temples he becomes a *dasa* (servant), assuming a supplicatory posture. Jambavat, king of the bears, is also remembered for his assistance to Rama in the Lanka war.

Buddhist myths too reiterate the sanctity of animals. Stories of the Buddha's progress towards enlightenment through a series of births as various creatures accentuated their significance. The Buddha himself is said to have sought refuge from the bickering of his disciples among animals who served him with devotion. The elephant, in particular, was highly regarded and credited with presaging the divine conception.

This was also embodied in Jain myths, where Mahavira's mother dreamt of a four-tusked elephant when she conceived the savior. Similarly, Mayadevi, mother of the Buddha, dreamt that a white elephant entered her womb. This episode is often sculpted in friezes on Buddhist shrines, particularly at Barhut and Sanchi. The sanctity of the elephant, and its depiction in the arts, increased as it became a symbol of the Buddha, who is said to have descended to earth as an elephant. Consequently, it was frequently represented to signify the Enlightened One.

The snake is another local deity connected with Buddhist iconography, where the Buddha is often portrayed sheltered by the multiple hoods of the King and Queen of Snakes. Symbolizing the Buddha's first sermon at the Deer Park near Sarnath, deer captivated Buddhist sculptors. They are frequently depicted on Mauryan abacuses with other animals associated with the Buddha, including the elephant and the swan. The latter is another favorite image for its legendary discerning judgement.

Buddhist Jataka stories dwell on the noble qualities of various species that are held up as examples to humans. These stories are part of a huge collection of allegorical animal fables that include the well-known compilations, the Hitopadesha and the Panchatantra. Consistent literary references brought new esthetic dimensions to animal forms. Animal imagery in the Vedas establishes the natural animate world as an immediate frame of reference. These later developed into lyrical, poetic similes, where even the ideal of female beauty was seen as reflecting, and indeed derived from, nature. The creator, it is said, took the best from nature and formed woman. This was the basis for extravagant similes that became the idiom of subsequent writings in which a woman's eyes are likened to a gazelle's, her black hair to a swarm of bees, her walk to a swan's, and so on in a wealth of parallels.

Extremely sympathetic were writings on the deer. Its gentle ways and simple habits were described and contrasted to the unhappy mores of the world. The devotion between the doe and stag has also been sung of by the bards and idealized. The deer was considered so sacred that, according

to Manu, an ancient Hindu law-giver, a place where deer wander unhindered is holy. Considering it most auspicious, ascetics in meditation sat on a chital or a blackbuck skin. Hunting of both was naturally frowned upon.

Secular traditions also evolved around animals, reinforcing old beliefs and introducing new levels of meaning to the representation in the arts. Ancient beliefs associating the elephant with life-giving water led to the custom of coronation waters being poured over a king by a female elephant. An ancient ritual to invoke rain involved anointing an elephant with sandalwood paste and then taking it in procession through town.

Admiration of the elephant's size and strength led to secular associations with royalty. A story of the subservience of an elephant to the renowned kind Chandragupta confirmed his destiny as emperor of the universe. When the king was preparing to meet Alexander's generals, a magnificent wild elephant knelt before him. Chandragupta mounted the beast and won many battles guided by its wisdom. Royal processions and battle scenes frequently depicted in the arts were crowded with splendid elephants. The elephant also became a favorite decorative motif set among floral patterns to enhance form and structure or was used in striking temple friezes. It was also a favorite device for architectural ornamentation, adorning pillars and cornices. A stylized version of the elephant's trunk often formed brackets. Another popular theme, later conventionalized, depicts the proverbial conflict between the elephant and the lion. While the former stands for the defeated but powerful enemy, the lion, as Lord of Beasts, represents the victorious king and the lion image was consistently associated with sovereignty.

Social rituals, like those requiring combat with a lion or a tiger to prove manhood or establish kingship, were later substituted by the symbolic act of a king stepping on a tiger or lion skin. Secular depictions of the great cats, including the famous lion capital of Ashoka and other depictions of lions in the quadrant position, represent not violence but strength and power. While this representation is stylized, a group of lions at Mamallapuram is most lifelike. Lion and tiger hunts were also popular subjects and were executed with skilled realism. Later, conventionalized lion-heads were commonly used as architectural ornaments.

Monkeys, revered for their association with Rama and Hanuman are also frequently represented. A remarkable sculpture, also at Mamallapuram, depicts a female nursing her baby, while the male busily picks fleas from her coat.

The peacock's ability to foretell rain by dancing at the first appearance of clouds, as well as its prolific breeding, associated it with fertility. This led to its association with the goddess and its continuing veneration as an aspect of the Earth Mother. The bird's legendary killing of snakes,

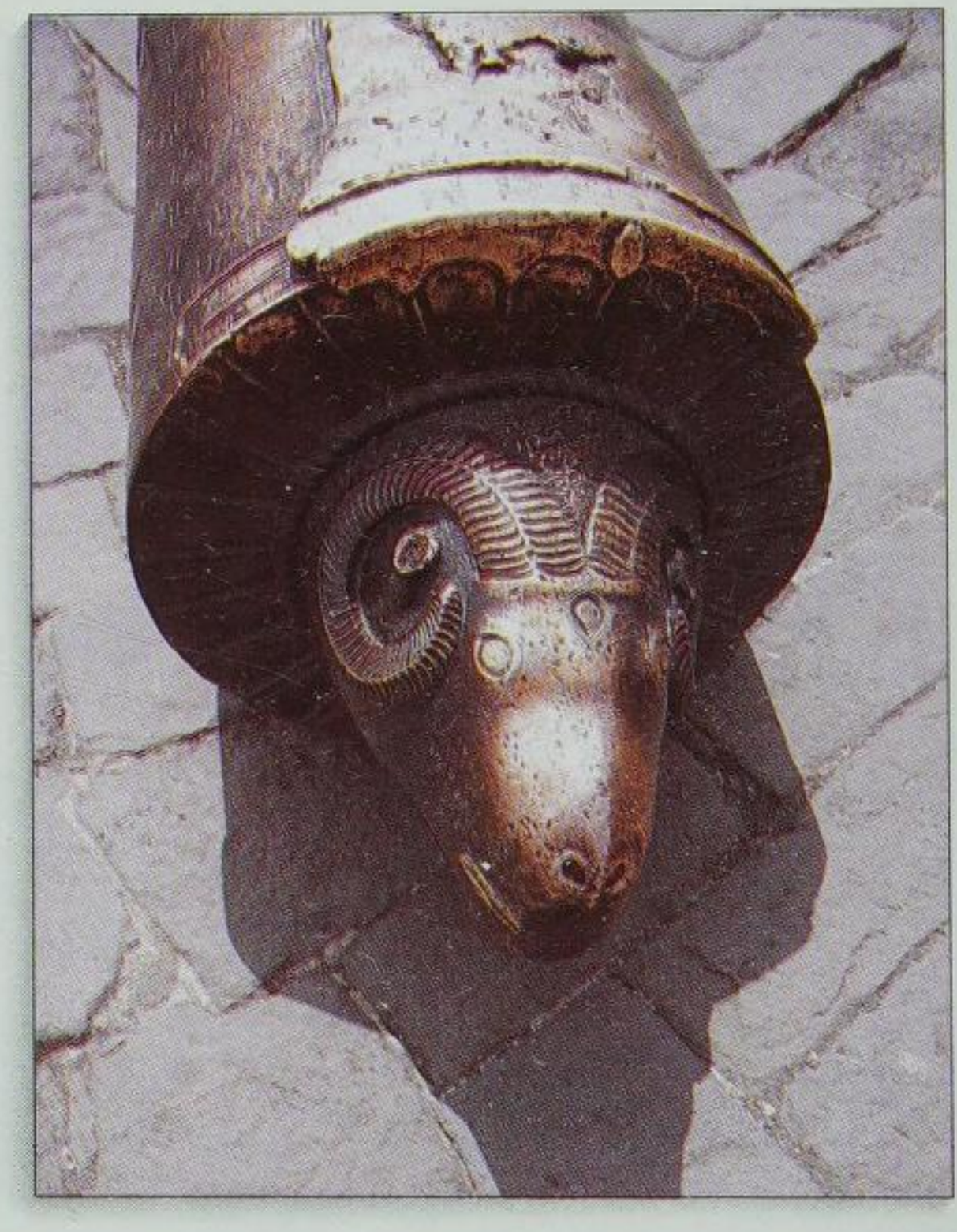
Left, Lion Capital of an Ashokan pillar, the emblem of the Government of India. Above, the boar incarnation of Lord Vishnu, Bandavgarh National Park, Madhya Pradesh.

seen as the destruction of evil, augmented its significance and led to its frequent depiction with a snake in its talons. It is also connected with Krishna, who always wears peacock plumes, and is often represented with peacocks to signify a sanctified or an idyllic situation. The enormous decorative possibilities of the peacock were, naturally, fully exploited by ancient architects.

Worshipped as an incarnation of the goddess Parvati, consort of Shiva, the kokil or cuckoo is venerated by women in some places during a month-long festival held every 20 years. Its presence and also its soothing call are associated with languorous summer days. The pigeon and the owl are said to be messengers of Yama, god of death. The vulture and other birds of prey are also considered of ill omen although they are sometimes presented with the goddess in her destructive

aspect. Said to be the most unclean of birds, the crow is associated with the goddess of ill luck, Alakshmi. It is, however, somewhat redeemed by recognition of its loyalty to its own kind and by the belief that the crow carries food offerings to one's ancestors. Artistic conventions bring it a new significance with the popular theme, often expressed in miniature painting, that the crow heralds the arrival of the beloved to the anxiously waiting maiden. Stories of the conjugal devotion of various birds, including the sarus crane, the brahminy duck and others, made them appropriate accessories in scenes of love.

Representations of animals and birds reached new heights of excellence in miniature paintings inspired by the Mughal Emperor Jahangir. These were initiated by his insatiable interest in the "strange" fauna of India, which he ordered be painted "so that the amazement from hearing about them may be increased." In compliance, several animal and bird studies were executed by Mansur, a master-painter of the imperial atelier. A host of others were painted by artists in Delhi as well as the provinces, creating a unique collection of exquisite animal and bird paintings. Stripped of all spiritual or mystic overtones, these portraits were painted realistically, with a naturalist's eye and are characterized by a minute and unprecedented attention to detail. This was made possible through techniques, both imported and indigenous, that were refined by generations of great painters. Brush strokes were so fine that each hair and every feather was individually etched, minutely detailed and shaded with amazing

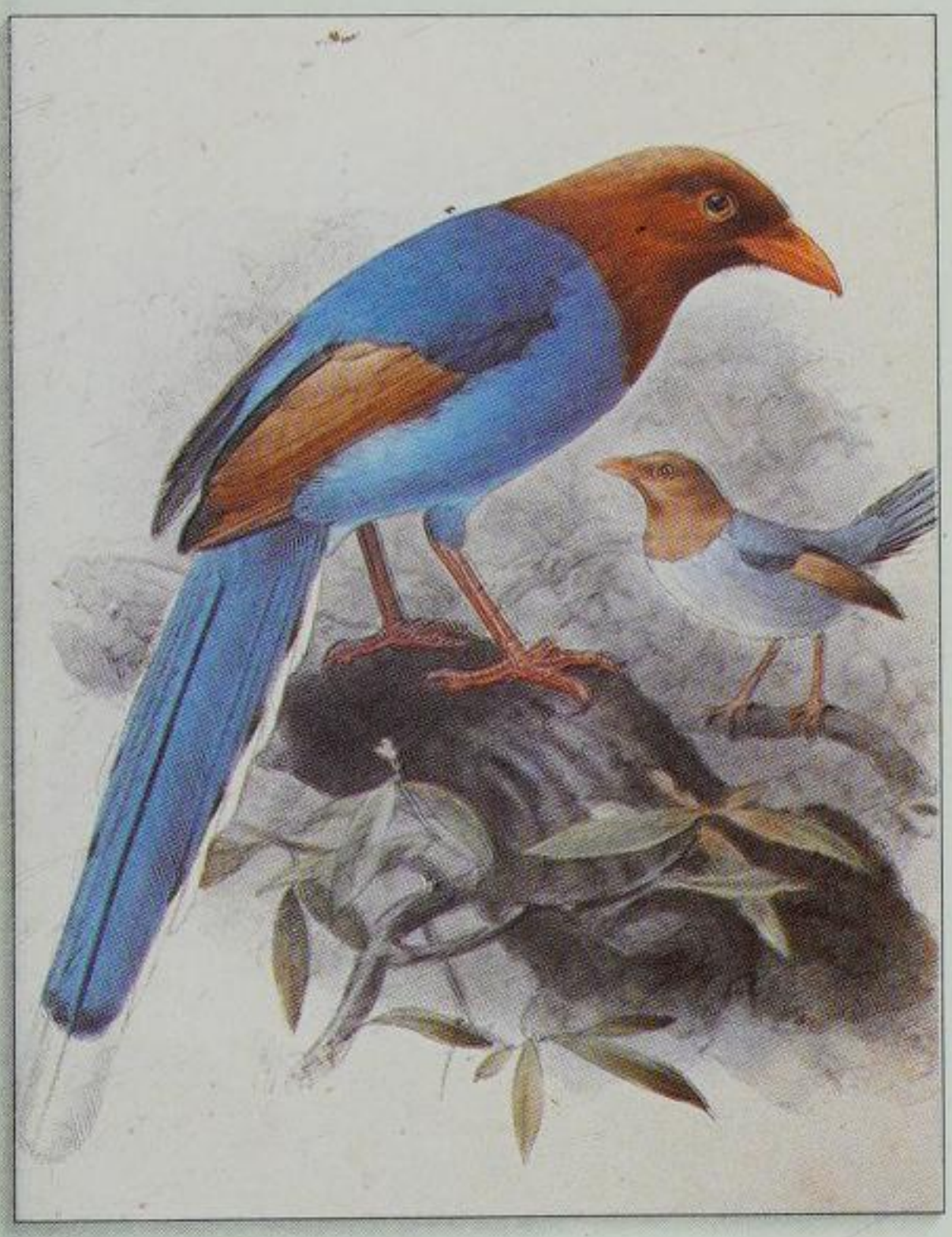


exactitude. Hunting scenes, also frequently drawn, were equally distinguished by naturalism and rendered subtle nuances of movement and muscle.

Provincial and local schools inspired by the imperial nucleus presented birds and animals with similar care. However, as several of these were established in Hindu kingdoms, or at least areas of considerable Hindu influence, old associations were revived. Animals and birds in these miniatures were again imbued with religious meaning and poetic allusions. They became important esthetic accessories, used to reinforce theme and heighten mood. Thus, dancing peacocks established that the painting was of the rainy season; the kokil indicated summer; deer, a gentle romantic mood; a crow, the imminent

return of a lover; and so on in a plethora of possible combinations of religious and popular beliefs, mythology and literary conceits.

Adivasi lore and art introduced a new dimension as it was based in a living tradition of animal worship. It was also molded by widespread worship of various species and taboos associated with them. An enormous and varied body of folk tales evolved. Some postulated theories of the origins of different species. Others established the sacredness of cult and totem images and dwelt on their beneficial or intimidating aspects. Telling stories of a culture that moves easily between the animal, the human, and the divine worlds, they are products of people who live close to nature. In some origin legends, humans marry animals, giving birth to various species. The tiger, for example, was one of a pair of twins born of a

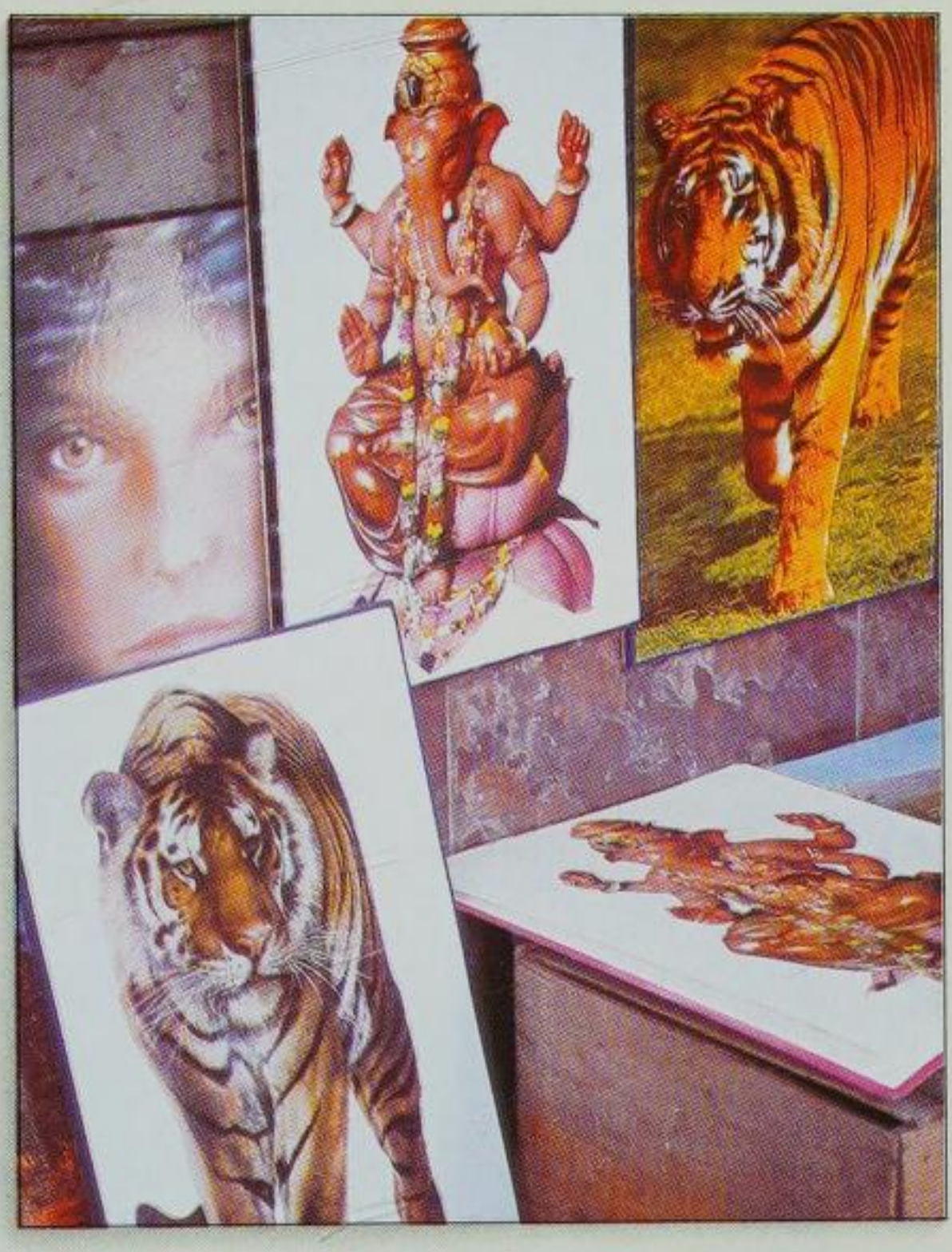


miscegenous marriage. Although the animal was subsequently killed by its human counterpart, all carnivores were created from its bones. Other stories suggest that primates were originally humans, degraded due to some moral failure.

There is the tale of the lazy boy whose stepmother turned him out. He later became a monkey. A Naga story tells of a man's in-laws fleeing to the jungle in shame as they were unable to perform a task he had set them. The men became mynahs and cried *kyon kyon,* while the women smeared rice flour on their foreheads and cried *woko woko,* becoming the gibbon with the distinctive white forehead.

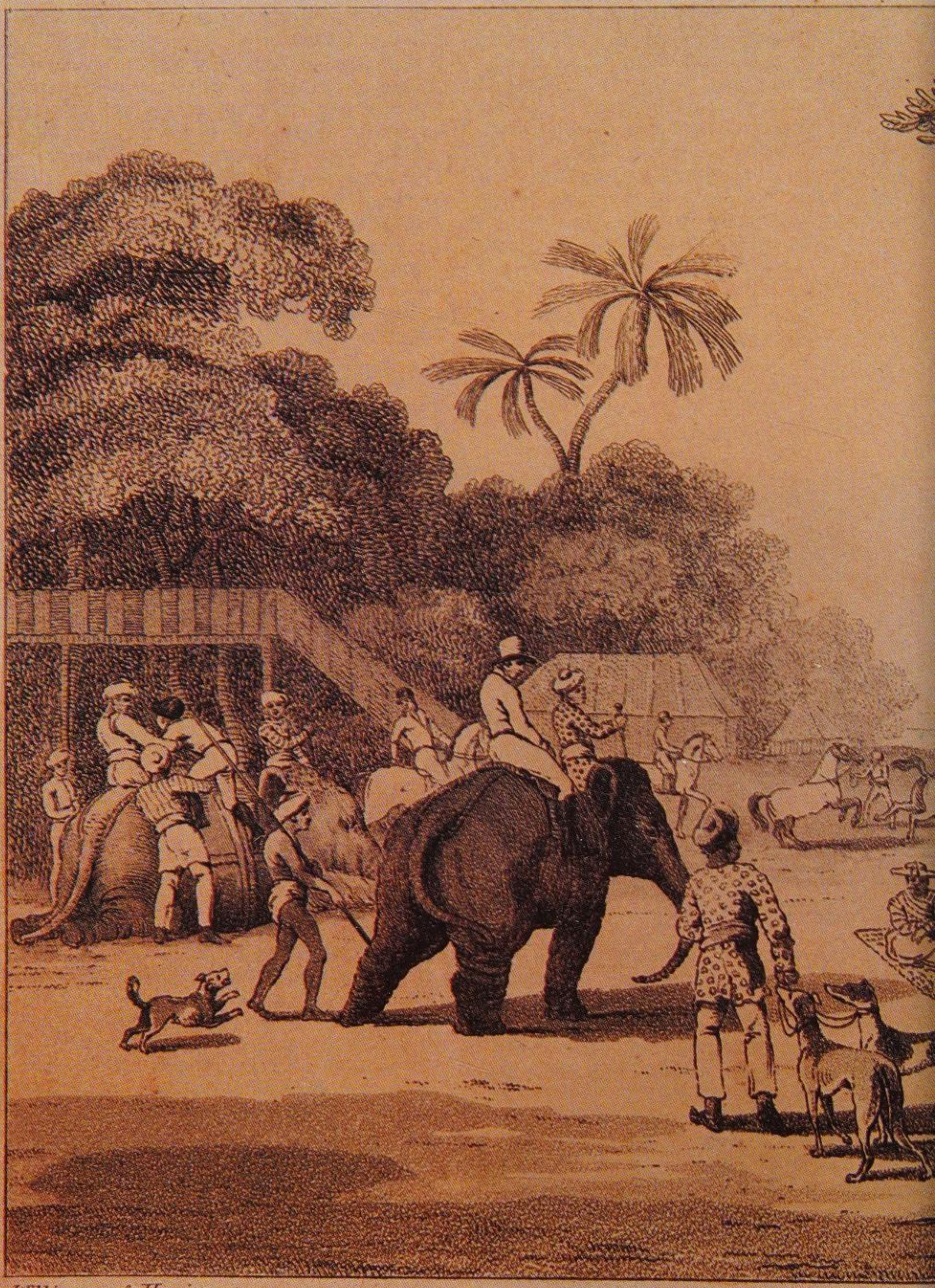
Other stories reflect attempts to comprehend the natural world. Tigers, for example, were created because humans were too fearless. However, the cats soon made it unsafe for the people to even collect wood. Accordingly, the gods instructed tigers to restrict their killings, which is why they attack humans only sometimes. The Konds of Orissa explained the destruction of their crops by elephants in a myth where elephants, "originally just like dogs," were badly treated by the group. They complained to the gods and were transformed, after which they consistently ravage Kond fields in revenge.

Various art forms developed to depict animals and birds. Expressing veneration and appreciation,



they were also attempts at propitiation and dominance. Dances imitating the movements of different species are performed by dancers wearing appropriate masks and headdresses. The crafting of these is still an important and vital art. Other crafts continue to create animal forms in terracotta, wood, wire and even straw. Some are potent ritual objects and votive offerings, while others just convey admiration and affection for the animal world. Although most are stylized, they are imbued with a knowledge of form and the sympathy of a people who live close to nature. These features, typical of all animal depictions in Indian art, whether in painting or in sculpture, tell a moving if intricate story of the peoples of India's empathy with the animal world.

From left to right: elephant panel, Ellora, Western India; ram's head on 17th-century cannon, Daulatabad fort, Maharashtra; 19th-century drawing of Ceylon blue magpie; and modern pavement poster art, Bombay.



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OBSERVING WILDLIFE

To most people, the word *jungle* conjures up images of dense, lush tropical forest with torrential rainfall, huge trees festooned with creepers, and infested with dangerous animals, snakes and insects. In its Sanskrit origins, the word *jungle* denotes any wild country, untamed land – a wilderness. How many trees grow on it and how tall, and what and how many creatures live in it, makes no difference. The semi-arid thorny scrub of Yala in Sri Lanka is no less a "jungle" than the steaming forest of Manas in Assam in Eastern India.

At the onset, it should be pointed out that, although the Indian subcontinent harbors a great variety of wildlife, the large assemblies of animals seen so often in the African bush are not seen here. Most jungles of the Indian subcontinent are thick and dense, with poor visibility. Animals living in such closed environments are generally shy and retiring, and live in small scattered groups, or even as solitary individuals.

Perhaps it is also necessary to explain why so many more birds than mammals are seen. Mammals are largely nocturnal, retreating into their hideouts during the day, and are usually silent. On the other hand most birds are diurnal, not so shy of man and quite vocal. Moreover, there are far more birds than there are mammals – India alone has about 1,200 species of birds against 350 species of mammals. So, while spotting a hundred species of birds in a day is not unusual, a mammal list of even 10 species is considered good. But the mystique and the romance of exploring the jungle here, perhaps for this very reason, is greater than anywhere else in the world.

Your safari kit: Your most invaluable companion while on a wildlife safari is a good pair of medium-size compact binoculars. For general purposes, 7x or 8x magnification is adequate, but for bird-watching 10x magnification is better as it brings out details of plumage clearly – so vital for positive identification. Many rare sightings have been missed because binoculars were not easily at hand. So carry your binoculars round your neck, and use them constantly to scan the area around you. You will be surprised how much more you will see if you do.

Another essential item is a three-yard (three-meter) tape measure, preferably the spring coil type, with both centimeter and inch calibrations, to measure anything of interest – dimensions of a den, the size of a track, the height of a claw mark on a tree, for example.

Preceding pages, 18th-century hunting camp. Left, otter and wader tracks on riverbank.

To record your observations, you will need a small notebook in which you may also want to sketch things of interest. Do not forget to mention the name of the place, time and date. In time, in this note book you will have put together an amazing variety of information.

When to look for animals: A national park or reserve is a living museum of nature's creations – landscapes, rock formations, water, plants and animals. But unlike in an art or historical museum where objects are on display, here you have to seek out your animals. You have to know where they live, when they move about, how to attract and approach them.

Not unlike people, animals are creatures of habit and have distinct daily and seasonal patterns of activity. An understanding of these patterns increases our chance of seeing them. The frequency of wildlife sightings in national parks and reserves varies, depending on the time of year. The Indian subcontinent is affected by the monsoons (in some areas twice a year), which influences the pattern of vegetation growth and the availability of food and water. This in turn affects the distribution and behavior of animals. Since the vegetation is overgrown and lush during the monsoon, and for a few months after, these are not the best months for wildlife viewing in most national parks.

Generally, the best times are from February to May. During these months the trees are often bare and the undergrowth dead or regenerating, so visibility is considerably improved. Since there is also a general scarcity of water, the animals concentrate near sources of water. In places where annual grass burning is still practised such as in Chitwan and Bardia in Nepal, regrowth of grasses attracts large concentrations of herbivores, who in their turn attract predators.

However, the time of year you choose to visit a park will also depend on what your are looking for. By "best months" is usually meant those in which one is most likely to see large mammals that are the main attraction of most national parks and reserves. But in Chitwan, for instance, the best months for seeing birds are February–March, for mammals March–May, for insects and for the lush jungle June–September, and for crocodiles, who come out of water to bask in the sun, October–February. The marshes of Bharatpur present a magnificent spectacle of breeding birds during August, September and October.

There are rewards for the nature lover at every hour of the day and night, but for watching mammals you have to follow their daily cycle of activity. They are mostly nocturnal and remain

active for two–three hours after sunrise. A night trip can be a very rewarding experience, but is not permitted in most parks and reserves, and rightly so. Animals should have at least some time to conduct their lives without human intrusion. Around 10am animals retreat for rest and lie in hiding, giving the impression during midday and in the early afternoon that the jungle is devoid of life. But they resume their activities around 4pm, filling the jungle with life and activity.

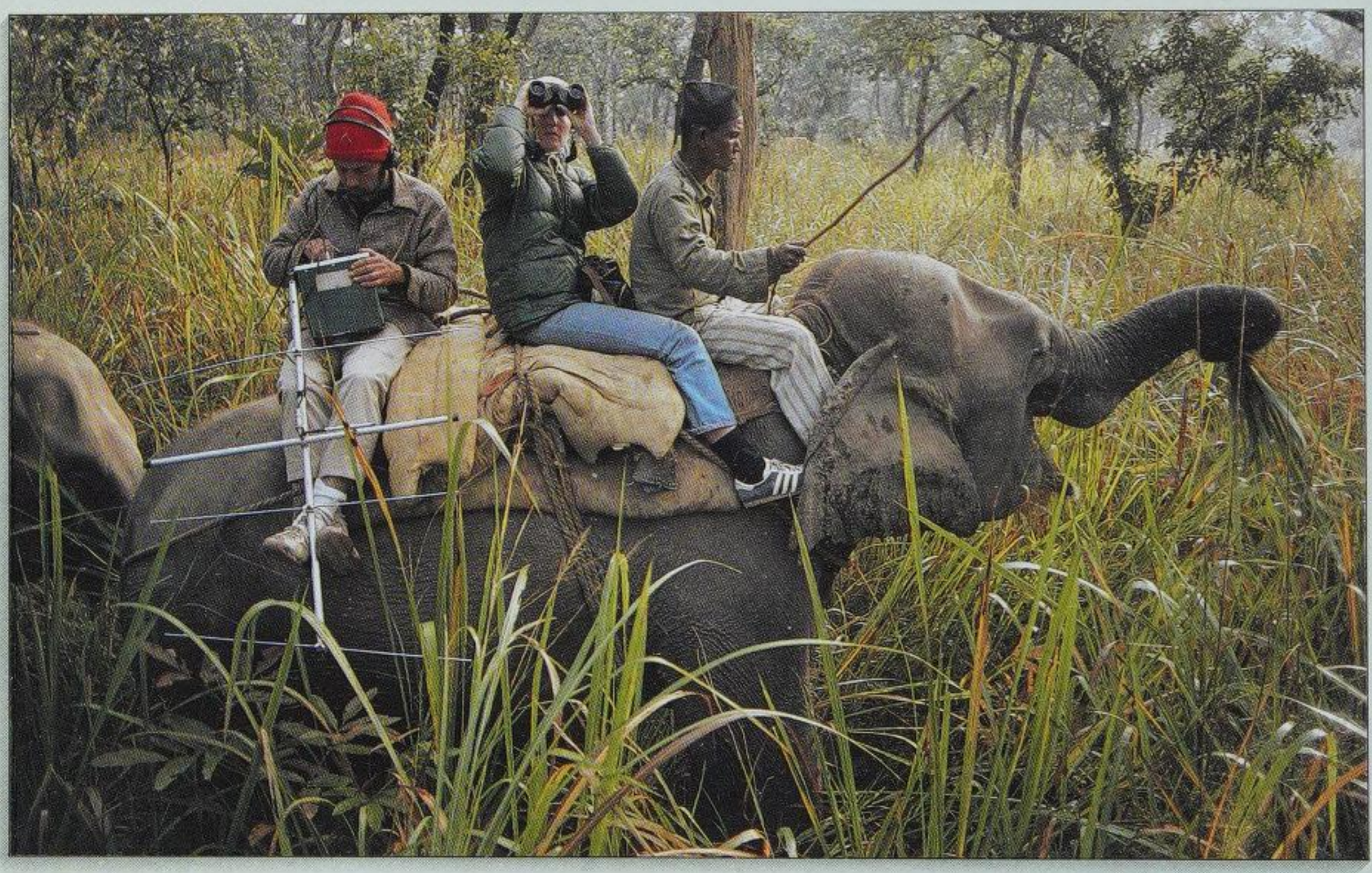
Your safaris are therefore best organized during the early mornings and late afternoons. In the winter, afternoon safaris are better as there is often a thick mist in the morning.

Monkeys, like people, are creatures of the day. They are up early and feed for a few hours before their midday siesta, when they sit around contentedly on the ground or in trees. They resume feeding activity in the afternoon and by sundown are ready to go to sleep. Langurs are noisy feeders and not only their calls but also their jumping from branch to branch make a loud noise, so their presence can be detected from a distance.

Where to look for animals: Animals are most conspicuous when they are feeding or at play and the most likely spots to observe such activities are grassy meadows, the edge of forests, at salt licks or near water holes. Herbivores have to feed daily for several hours, and the heavyweights, such as rhino and elephant, have prodigious appetites and may spend 15–18 hours a day feeding, thus making themselves very conspicuous.

Open grass meadows and river banks are the favorite grounds of hoofed animals, where the short grasses provide them nourishment. For ungulates the tall grasses are often inedible and therefore of little value, except as shelter. In a forest thick with trees and scant grass, hoofed animals will usually be thinly spread but leaf-eaters, such as langurs, are usually common. Recently burned patches of grassland and forest attract deer, antelope, wild boar, gaur, buffalo, rhino and other herbivores who come for the new succulent grasses.

Most mammals have to drink at least once, if not twice, a day. In areas where water is plentiful, such as the floodplains of Chitwan, Manas and Kaziranga, animals are evenly spread out. But in places where water is localized, as in the Siwalik hills of northern India and Nepal, mammals usually stay close to water, especially during the afternoon when they come to drink. In arid areas with scant rainfall, water is in short supply during the summer before the rains, so this is the time to look for animals near the few remaining sources for water. Predators often lie, in cover, near a water hole and take their chances on the prey species that wander within range. This also explains why herbivores are so nervous when approaching these spots.



Large animals also use water for cooling their bodies. In the steaming months of May and June, tigers lie in secluded pools in the jungle, and elephant, rhino, buffalo and wild boar also have favorite spots to wallow in the water or mud.

Radio-tracking tiger, Smithsonian Tiger Project, Chitwan, Nepal.

Mammals also visit salt licks regularly to replenish their body stocks of vital minerals. Over the years, salt licks become well known to the animals living in the area, and elephant, rhino, gaur, deer, monkeys and others come to them from time to time. A salt lick may be part of a hillside, a patch of earth or clay, or buried in the bed of a spring, lake, river or stream.

How to conduct your safari: Dress comfortably, in clothes that permit easy movement, and avoid wearing bright colors that make you conspicuous. Jungle-green, khaki, or beige camouflage are preferred for tropical and subtropical environments, but in the Himalaya, where snow is present, light neutral colors may be most suitable. The idea is to blend with the surroundings so that you do not unnecessarily announce your presence from a distance.

Animals are very wary of the human voice. So, in order to get close to them, absolute silence is essential. Walk lightly and unless in the mountains, avoid heavy boots; sneakers, or running shoes are best.

Animals living in closed environments have an exceptional sense of smell and will detect and avoid human scent. While stalking animals, it is therefore important to stay downwind of them or you will give your presence away sooner than you think, especially if there is a gentle breeze. For the same reason avoid wearing perfumes and, if using insect repellent, choose the kind that smells the least. Also, no smoking, please.

Move slowly, as this gives you more time to look around and you are less conspicuous to the animals, thereby permitting you to approach closer to them. Walking slowly is also safer. A hasty step might bring you face to face with a rhino, gaur, elephant, or tiger – encounters of a kind that is best avoided. In South India, which has a good population of poisonous snakes, it pays to look where you step. Even while in a vehicle, a slow drive gives you the time to scan the area around you.

Most times the animals will spot you first and disappear without your knowing it. There are far more human sightings by animals than animal sightings by humans. Occasionally you will know that you have been spotted when you hear or see animals bounding away. They may even give an alarm call which will convey a warning to other creatures.

But if you spot them first you should move cautiously, using every bit of cover to your advantage, freezing every time they look in your direction. A deer or antelope will soon get your wind and will try and pinpoint you with its nose, eyes and ears.

Some animals are inquisitive and may even come towards you. But under no circumstances should you stalk or go close to large carnivores and other potentially dangerous animals. Most animals will retreat at the sight of man but the large animals may have good reason not to. A leopard or bear may be guarding her cubs, for example. Under these circumstances they are likely to warn you with a noisy snarl before you come too close. If you do not heed that, it is at your own risk.

Some drivers and guides, in the heat of excitement, will take you dangerously close to potentially harmful animals. Or perhaps because you want a close-up photograph. This kind of drama should be discouraged as casualties are likely to occur if you violate the personal space of wild animals and make them feel vulnerable. In a national park or reserve their welfare comes first and disturbing, harassing or unnecessarily provoking them is taboo.

On a nature walk, keep your senses on the alert. Most animals blend extremely well with their environment. The spotted fur of the leopard breaks its contours and is invisible in the light and shadow of the jungle. Even the giant elephant merges with the gray tree trunks and the undergrowth. But don't get obsessed with seeing animals: the imagination can play tricks and you may start "seeing animals" that are not there. A rock on the mountainside may become a black bear! And a black bear a rock!

Two ways to maximize your chances of seeing animals are:

- to watch them from a hide or blind, locally known as a *machan,* where you wait for them to come near you while you are hidden from their view; and
- to actually go out in search of them by vehicle, elephant, boat, or on foot.

This may sound simple, but to get the best results requires deep knowledge of the wilds and its denizens.

Machan: A *machan*, as explained, is a hide or blind in a tree or on the ground. When on the ground it resembles a hut with several peepholes to look out from. They are best made from local materials – trees, bamboo, grass, leaves, stone, or mud. A good temporary or mobile *machan* can be made of canvas or burlap stitched to size, with custom-made windows and an exit door. It can easily be put up with the help of sticks or its own set of aluminum poles. It should be jungle-green or light brown in color or with a camouflage pattern to break its outline.

Such a collapsible *machan* is essential to the wildlife photographer. The idea of a *machan* is to become so inconspicuous that animals come close to you without detecting your presence. In this respect, a tree *machan* has the advantage that, apart from providing a better lookout point, human scent disperses from it more rapidly into the upper air than from a ground *machan.*

In an area where wind or breeze is a constant

factor, especially during the mornings and afternoons when you are most likely to use a *machan*, it is best sited downwind from where the animals appear. A *machan* must also not stand out from the surrounding landscape if animals are to approach it without much hesitation. If situated in a thick jungle, it is usually hidden and camouflaged by foliage; if in an open area, it may be so placed as to appear to blend with a natural structure such as a termite mound or rock outcrops.

A *machan* usually overlooks a natural water hole or a salt lick (either or both may be artificially created if necessary), and occasionally open ground with a long view. Unless water is plentiful in the area, *machans* overlooking water holes are very productive for spotting animals. Smaller animals such a porcupine can be attracted by regularly leaving some potatoes and other vegetables on a spot frequented by them during the night. Carnivores, such as tiger and leopard, can be baited by using a chunk of meat or by tying a buffalo calf or goat in their path.

But, whatever the advantages of *machans*, from them you can only hope to see the animals that chance to come by. When you go out in search of them, whether by landrover, on elephant back, by boat or on foot, in full view of the animals that you seek, while you have the freedom to look for them in the most likely spots, you also run the risk of announcing your presence and warning them away.

Safaris by landrover and elephant: For some unknown reason, most wild animals seem quite indifferent to the sight and sound of a vehicle and during the night the headlights seem to mesmerize them. In fact, it is amazing how close you can get to some animals by vehicle. As the sound of the engine does not seem to bother most animals, it is best to keep the engine running as this not only drowns human noises but also ensures speedy escape if your subject happens to be big and angry. Animals may accept the presence of your vehicle, but this does not mean that they will continue to "cooperate" if you step out of the vehicle. Why animals should tolerate such an alien object as a truck, and bolt at the sight of humans, no one knows. Perhaps vehicles, although strange, do not seem dangerous to them, whereas they have a long history and tradition of the need to avoid people.

Vehicles have the advantage that you can cover a large area in a relatively short time. Tracks in the parks are rough and you may need to cross streams, rivers and muddy places and they give you quick and easy access to the best spots for viewing animals. But vehicles will only take you where there are roads and since driving off-road is usually not allowed in most national parks, you will have to resort to other means – travel by elephant, boat and walking.

Elephants have long been used for hunting, and more recently for forestry operations, wildlife management and wildlife watching. Nepal and India must be among the few Asian countries to employ elephants for wildlife tourism.

Elephants have the advantage that they can go to places where no vehicle, boat, or man on foot can go. They will climb up hillsides, negotiate steep banks, and walk through marsh, swamp and thick jungle. In fact, were it not for the elephant, tall grasslands, like those found in Chitwan and Kaziranga, would be so much more difficult to explore safely.

Elephants, however, dislike and avoid deep rivers and strong currents and quicksands. They give you a feeling of security and, although they are quite timid by nature, few animals will attack them. Rhino and tiger have been known to, under provocation, but perched on the *howdah*, 10 feet (3 meters) from the ground, you are quite safe. The only disadvantage is that elephants move slowly and therefore you can only cover a small area in each outing.

Despite the human smell and noise, most animals tolerate people on elephants. In fact, even the keen-nosed wild elephant will allow a man on a domesticated elephant to approach and sometimes even mingle with the wild herd. (In Mela Shikar, men on trained elephants display much daring in capturing wild elephants by actually mixing with them and cleverly sneaking behind the chosen candidate for capture and chaining it with a noose. It will then quite happily follow the domestic elephant – with a little encouragement.)

Elephants with their keen nose constantly pick up smells left by other animals. Being the largest creature in the Asian jungle, they will ignore most animals but they have an instinctive dislike of large carnivores. If such an animal is nearby, an elephant might resist going towards it, but it will show no fear of an immobilized (drugged) tiger or a dead one. It also dislikes going close to gaur, buffalo and rhino.

Signs in the jungle: Wildlife observation may be direct, when you actually see the animals in their natural state, or indirect, when you "observe" their presence or passage by their spoor, scats, shelters, smells, sounds and so on. The jungle is full of such signs but their interpretation is not simple; therefore only the most obvious are mentioned here.

Look for markings on trees in the jungle. Deer rub their antlers against small trees, usually to clear their velvet, and leave distinct marks of injury. And depending upon how high the marks are from the ground, between one–four feet (30–120 cm), you can make a good guess as to which deer species was responsible for it.

In rhino country, rhino rubbing posts are frequently encountered. They are usually three–five feet (about 1.5 meters) above the ground on a

sloping tree trunk or stump. From regular use, the rubbed area becomes smooth and devoid of bark, often with a coating of mud. In elephant country, trees with stripped bark, uprooted trees, and twisted branches betray their presence. Bears and leopards leave distinct claw marks on the trees they climb and tigers habitually rake their claws on trees, leaving deep gashes, sometimes with fragments of claw in them. Other types of cat also indulge in this form of marking/cleaning.

A forest floor littered with fresh fallen leaves and twigs indicates the feeding activity of langurs. Chital often take advantage of this "free lunch" and follow the monkeys who feed in the treetops.

In the jungle all kinds of cavities and holes may be seen in rock, on the ground and in trees. These are often shelters or dens used by a variety of animals and birds. Most carnivores live in burrows. They either dig these themselves or appropriate existing holes and cavities. Porcupine warrens are elaborate systems of tunnels under the ground usually with two or more entry and exit points. They are often recognized by the gnawed horns, bones and antlers lying at the entrance.

Wild boar rootle the ground for food and leave tell-tale patches of loose upturned earth. Sloth bears dig up termite mounds at their bases and suck up the insects. These diggings may be 3 feet (1 meter) deep, and sometimes even larger craters may be excavated by them in search of choice food.

Elephants have an exceptional nose and where water is scarce will locate it under the ground, dig a hole with their forefeet and drink the clear water that collects at the bottom. Other animals use these "water holes" after the elephants have left.

Otters live in burrows with an underwater entrance although their living chamber is above the water level. Their burrows are usually at the bases of trees, among the roots. Even large carnivores like brown and black bears hibernate in cavities during the winter. Contrary to popular belief, tigers and lions do not live in caves or dens, although occasionally they may use them as shelter. Tiger "dens" are usually very secluded spots in the forest or tall grass where they are least likely to be disturbed.

A common sight on most steep river banks are holes used as nests by the sand martin. Bee-eaters and kingfishers also nest in burrows. The tailor bird stitches a nest out of one or more leaves, and the weaver makes a graceful nest hanging from a branch.

The most interesting nest is made by the giant hornbill. The male seals his mate in a hole in a tree, using a plaster of clay and debris, leaving a small opening through which he feeds her. When the chicks hatch and are large enough, the female breaks open the wall and emerges. The couple then replaster the opening and continue to feed the chicks through a hole until they are ready to come out, when the wall is broken once again, and the family set out into the jungle.

The shape, size, color and smell of mammal droppings can give clues to which animals live in the jungle. Local Adivasis and trackers are often very knowledgeable about droppings. The contents of herbivore droppings give useful indications of the plant species eaten, and carnivore droppings of the species of prey consumed. Exceptionally, you may find something particularly interesting, such as the claws of tiger cub or leopard in tiger droppings.

Some animals, such as civets and weasels, habitually defecate at "latrines" and, in time, large piles are formed. Large quantities of wolf droppings may be found near its den. Rhinos also have dung piles which, after months, even years, of use become huge accumulations. Some animals, such as the red fox and the otter, defecate at prominent spots, such as on stones, a fallen branch, or on top of a mound. Birds of prey, herons and owls regurgitate matter from their mouths. These distinct pellets, consisting of bone, feather, hair and other indigestible matter, are often found in large numbers below a favorite perch or roosting site.

The sounds in the jungle often give clues to the identity of the animals producing them. With training and long experience you learn to recognize the sounds of most birds and mammals. In fact, identification of a bird is sometimes easier from its call than from its sighting, and elusive birds, such as cuckoos, are far more often heard than seen. Birds of the night, such as owls and nightjars, are difficult to recognize but have very distinctive calls, making it possible to identify them instantly.

The roar of a lion, the alarm call of a sambar, the trumpeting of an elephant, the whistle of a wild dog, are all sounds betraying their identities. Some sounds will tell you more. The bugling of a hundred barasingha stags will tell you that their rutting season is on.

If you hear rhino huff and puff, snort and grunt, thundering about in the tall grass, and then a peculiar whistling sound, you know that two rhinos have had a dispute; or perhaps a male is chasing a reluctant female. The alarm call of a peafowl or a deer often indicates the presence of a tiger or leopard. The rhesus will bark agitatedly and the langur makes the distinctive call *(kha-ko, kha-ko-kha)* that almost invariably means tiger or leopard.

Carcasses of the kills of large predators are often betrayed by vultures, crows and blue magpies. By mid-morning, the vultures riding the thermals in the sky spot the carcass or the excitement of crows, and are attracted to it, and within the hour dozens of vultures descend on the carcass

out of the sky. If you see vultures heading in a particular direction and follow them you will certainly come upon a dead beast or its remains.

Approach a carcass with caution, especially if the vultures are in the nearby trees or on the ground at a distance. This often indicates that a large carnivore is nearby. Hungry tigers can be possessive of their kills and, although they usually retreat at the sight of man, they might not.

Tracks around the kill will indicate which carnivore or scavenger has been feeding on it. Leopard and tiger kills may be distinguished by the size of canine punctures and the gap between them, these being always larger and wider in the case of a tiger. The tiger begins to eat from the hindquarters, the leopard from the stomach or chest. The tiger's feeding is quite clean, with the alimentary canal left unpunctured, but the leopard is a messy feeder.

Leopards usually take their kills into trees, especially when in open areas, in order to protect them from other predators and scavengers. Tigers, on the other hand, stay near the kill for up to several days, depending upon the size of the carcass, and will resent intrusion and often rush at the vultures and manage to kill one or two. In order to hide the carcass from competitors, the tiger covers it with earth, twigs and other debris. Lions are communal feeders and usually finish the kill in a single sitting and so do not need to guard or stay near it.

Tell-tale tracks: All terrestrial animals leave impressions of their feet on the ground as they go about their business. A good tracker, by looking at the tracks and trail (a sequence of tracks), can often tell the species, age, sex and speed with which the animal was moving.

Adivasi groups, who will supplement their diet by hunting, are very knowledgeable about the natural history of their area and have the knack of reading tracks and other signs with accuracy. A reliable interpretation of the signs in the wild gives them clues as to where to put traps, what kind of traps and what bait to use at what time of year and day.

Roads, banks of rivers and lakes, the seashore and snow are the best places to look for tracks. But not all tracks reproduce faithfully and in fact those made by the same animal may look different, depending upon the hardness of the ground and the gait of the animal at the time. In deep mud and soft sand or snow the tracks are indistinct and larger than life, whereas on harder ground they will be more realistic and show details of the contours of the feet. If the animal is running, the tracks will show a slide mark in the direction of travel, the slide being more pronounced on soft ground. The toes or hooves will often splay for better traction and the impact itself will cause the tracks to be larger. In deep snow or sand a running animal will leave quite unrecognizable tracks.

An early morning walk is the best time to study tracks as at that time they are fresh and well preserved. As the day wears on, tracks are gradually obliterated by the action of the elements, and by the activities of people.

In an Indian jungle the most conspicuous tracks are those of the tiger and by following a fresh tiger trail you can learn about its activities of the previous night. Track one with the help of a professional tracker or guide and you will be amazed at the information they will be able to infer on the animal that made them.

From the size of the tracks they will perhaps infer that it is a male and, if they have tracked tigers regularly in that area, even identify which male. Soon you will be shown where the tiger sat for a while, where he started to run, and began to stalk. From time to time, you will scent a strong musky smell and a closer examination will reveal that the tiger has been marking his trail with a spray of urine.

Here the tiger has scraped the ground with his hind paws and defecated, leaving evidence of what he has eaten. Halfway down the road his trail mixes with those of a female and as the tracks of both are equally fresh, we know they were together. Tracking, if expertly done, will sometimes lead to the animal itself, its kill or den.

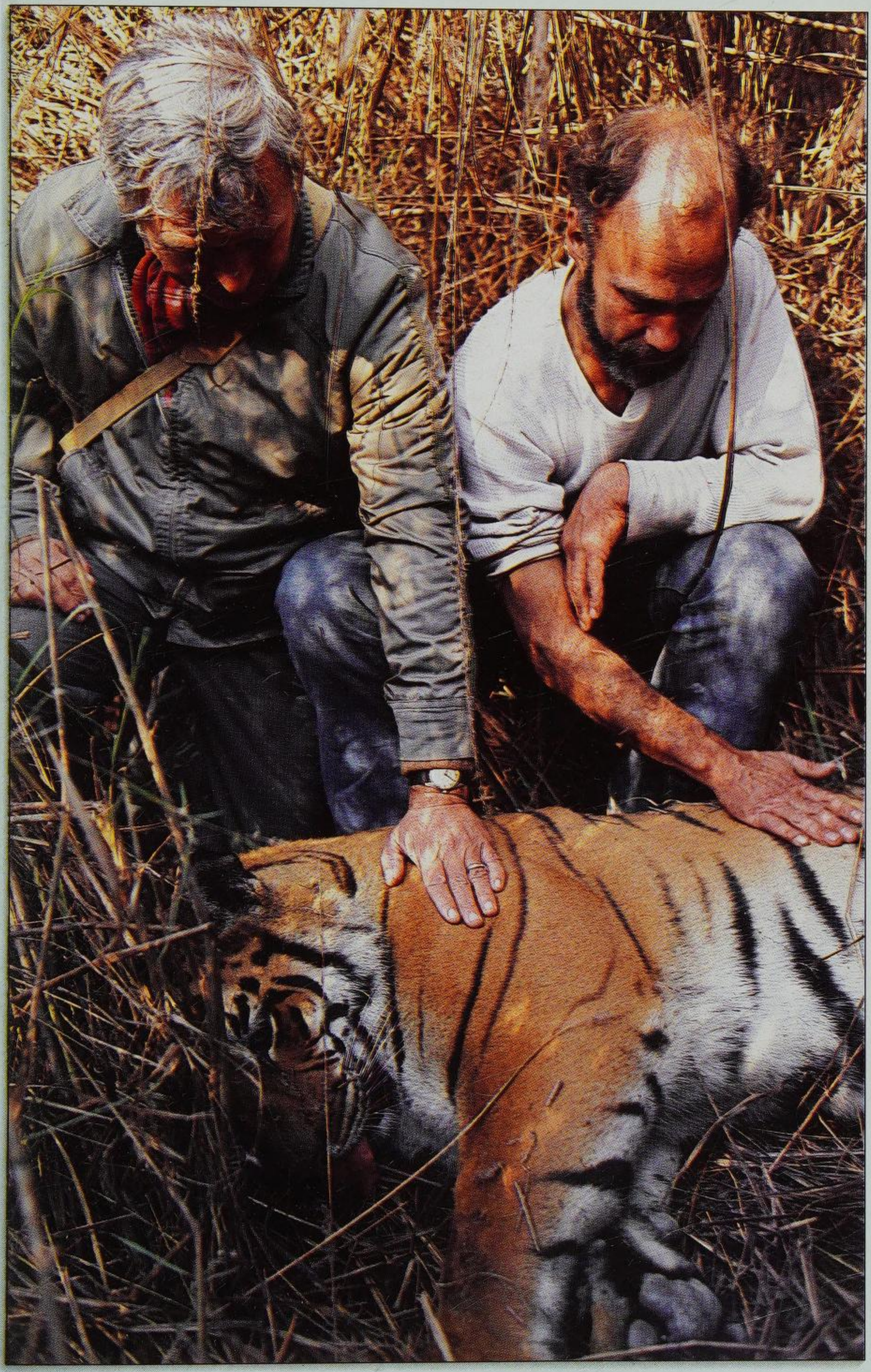
When you see a track you may want to sketch it, but this is easier said than done. A simple method is to use a rectangular plate of glass 8" x 12" (20 cm x 30 cm), in a wooden frame, the molding of which is about a quarter inch above the surface of the glass.

When you place this tracer flat on the ground over the track, the glass will be slightly raised and the track will remain intact. Now with a medium-point black felt pen and with your eyes vertically over the track, trace its outlines on the glass exactly as you see them. Then trace the track from the glass on to thin tracing paper, and you have a permanent, lifesize record of a track.

In a national park or reserve, ideally, nothing should be removed. Even such seemingly valueless things as antlers on the forest floor, or a dead log, have their role in the scheme of nature. In a way they are as much a part of the jungle as the deer and the tree that shed them. The antler will provide minerals to porcupines, rodents, etc., and the deadwood will sustain a number of insects. Later, when the antler and the deadwood have disintegrated, they will return the minerals to the soil. And so, in a cycle of life and death, nature in all its glory should survive intact as we see it in the jungle.

(For guidance on Photography, see "Travel Tips" at the end of this book.)

Scientist monitoring tranquilized tiger.



THE FORESTS

Today, with a renewed emphasis on environment protection, forest development has, like many other matters of ecological significance, become a focal point of activity. Forests were greatly valued in ancient India. Everyday life was closely connected with nature; kings protected forests and ascetics retired to them for peaceful meditation in their quest for salvation *(moksha)*. Emperor Chandragupta Maurya, as early as the 3rd century BC, had forests classified as those used for religious purposes and others to be exploited commercially. He also allotted some forest areas for hunting. Forest offenses and careless deforestation were punishable by death. During Emperor Ashoka's reign (3rd century BC), several species of trees were identified for protection. The abundant evidence of natural forms in the Indian art of this period reflects a great affinity with nature.

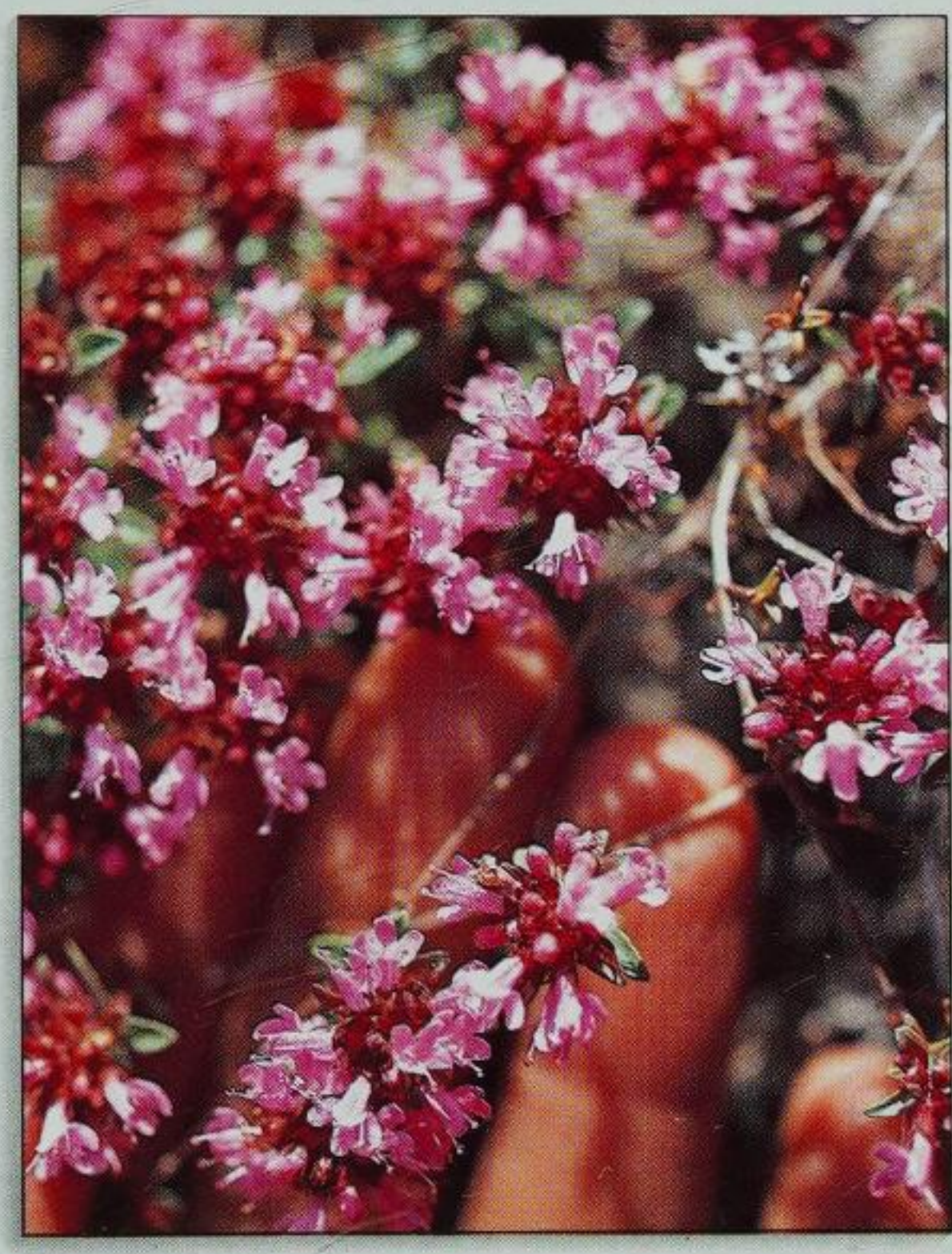
Alexander is said to have used Indian timber for building ships in the 4th century BC. For many centuries Indian wood was exported to Persia and Arabia, but this commercial activity was on a very small scale compared to the immensity of India's then forest resources and had no noticeable effect on the extent of forest cover. Hundreds of years later, in Mughal times, there was a great deal of hunting in the forests of North India.

Nevertheless, although the Mughals had no positive interest in conserving forests, they did not harm or denude them. At the turn of the 19th century, however, the British developed a keen interest in the valuable woods of the Indian jungle. Some of the ships in Nelson's fleet at Trafalgar had been built by the famous Bombay shipbuilders, the Wadias, teak replacing the English oak. Trees yielding prized wood like sandalwood, rosewood, satinwood and ebony were felled for commercial purposes, doing great damage to India's forest wealth.

Despite steps taken by the British in the early 19th century to regenerate forests, in the long run they encouraged agriculture at the expense of forests rather than as complementary to them. This short-sighted policy did immense damage.

Since Independence, the Indian Government's New Action Plan for Forestry has declared 33.33 percent of the whole land area of the country (60 percent on the hills and 20 percent in the plains) as reserved for forests. However, this has not prevented further extensive encroachments on India's forest cover (now less than 9 percent in India) and unless firm and effective action is taken soon, the future does seem grim indeed. The situation in Nepal is equally serious. Destruction of forests there has resulted in frequent landslides and bare hillsides. In Sir Lanka, the situation is better, though also critical.

Natural vegetation: An immense variety of flora is found in South Asia. In fact, due to climatic diversity in the subcontinent, it covers a whole range of types of vegetation regions from swamp and thorn forests to alpine forests. The amount of rainfall and average temperature, the topography, soil conditions and altitude are the major factors



that affect the vegetation of a region. Clean-cut lines demarcating each type are naturally impossible, and there are many areas where a mixture of types of vegetation is seen. The overlapping of types occurs both on the mountains and in the plains. Nevertheless, India can be divided into broad phytogeographical zones.

The Deccan: This region, otherwise known as the Deccan Plateau, comprises Tamil Nadu, Andhra Pradesh, a large part of Karnataka, Madhya Pradesh, Orissa, and parts of Maharashtra and Gujarat. Even within this peninsular area, the differences in annual rainfall cause variations in the natural vegetation.

In the southern portions, consisting of hilly terrain, the annual rainfall is 34–40 inches (86–

Preceding pages, tropical rainforest. Left, rhododendron, Nepal and right, Himalayan flowering shrub.

100 cm) whereas in the northern parts of the Deccan the rainfall increases to 56 inches (142 cm). Dry deciduous forests rich in teak *(Tectona grandis)*, known for its excellent timber, is the dominant variety.

Other large trees like mahogany *(Swietenia)*, Indian rosewood *(Dalbergia)*, *Terminalia* and *Chikrassia* also grow here. These trees have abundant foliage and are of majestic dimensions, often growing to great heights and spreading wide. The sandalwood tree *(Santalum)*, with its fragrant wood, is particularly common in Karnataka. This tree is slender, with small leaves and tiny fruit. The wood in the living tree has no scent, yet the dry wood has a strong fragrance.

Intermittent patches of color break the monotony of vast expanses of forestland. The flame of the forest *(Butea frondosa)* is a burst of pale orange when in bloom, while *Bauhinias* and *Lagerstroemias* are laden with delicate white, pink and mauve blossoms in the flowering season. *Cassia fistula* with its shower of pale yellow flowers and *Cassia nodosa*, which has pink inflorescences, are exotic flowering trees that dot these forests.

Many forests have a mixture of *Acacia*, *Dillenia*, red sandalwood, *Odina*, *Grewia*, *Buchanani*, etc. Many epiphytic orchids adorn the trees in some areas – using the host tree for support and to gain access to sunshine, not living off the tree as parasites do.

In the northern stretches of the Deccan, sal *(Shorea robusta)* forests extend from Madhya Pradesh to Orissa, and present a totally different picture. Sal trees are straight, compact and tall, with rounded leaves, and grow close together, forming stretches of homogeneous forests in continuous belts for many miles.

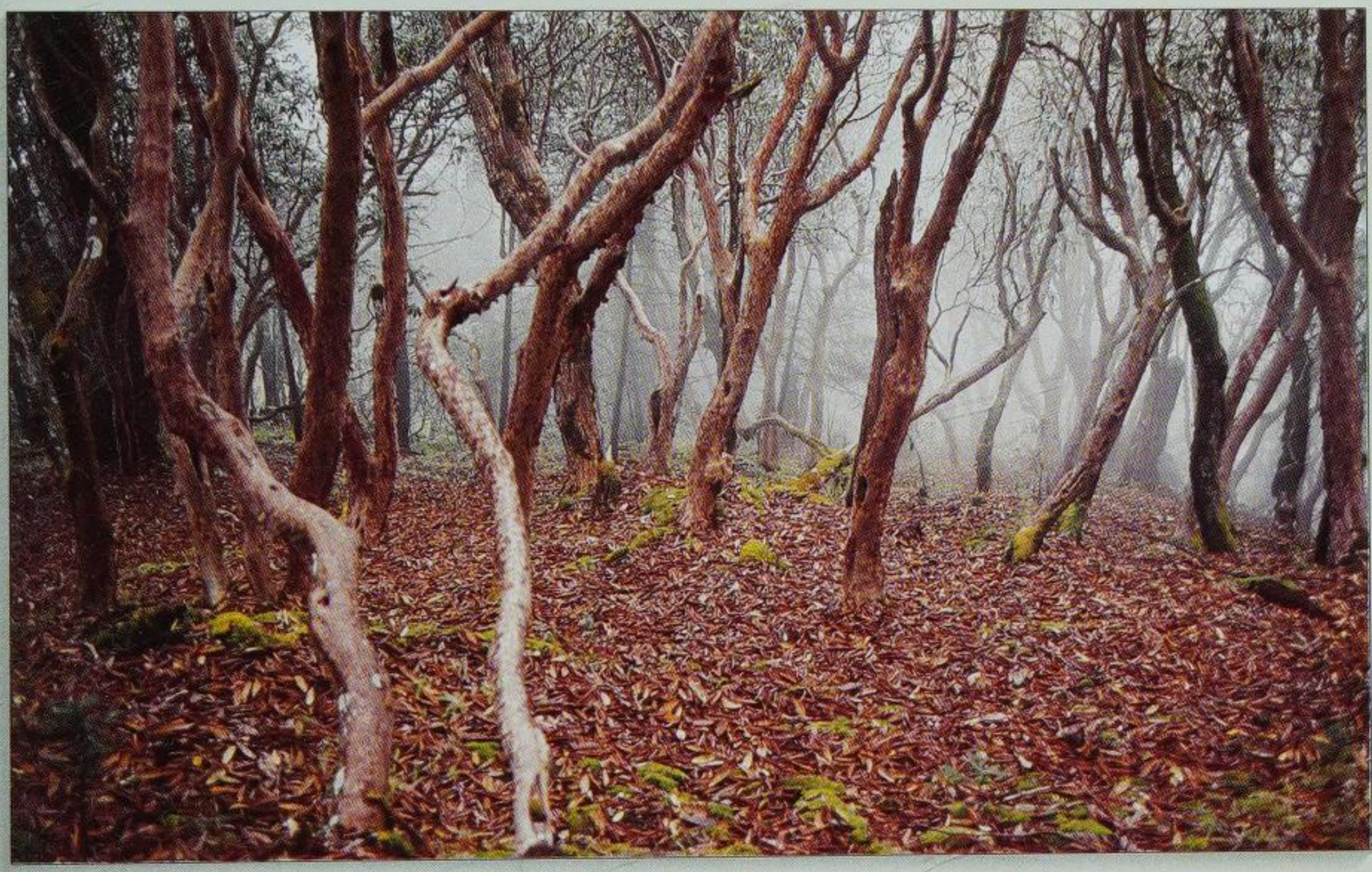
In those areas of the Deccan where rainfall is lower, the vegetation changes to scrub forests. The hardy trees here are, to a large extent, thorny and well adapted to dry climate conditions. The mixed population of trees consists of *Zizyphus*, *Acacia*, *Capparis*, *Balanites*, *Euphorbia*, *Flacourtia*, *Prosopis*, etc., forming thinly wooded forests.

Coastal areas: These form a striking contrast to the forested areas although lying in close proximity to them. Here, there are long stretches of coastline with symmetrical coconut palms that bear a rich yield of coconut. Further inland in the coastal plain jackfruit and mango trees are plentiful along with tamarind. In some pockets of the Deccan coast, near the river estuaries, mangroves, typical of wet marshy areas, are common.

The **west coast region** comprises the Western Ghats and extends from Gujarat in the north to Kerala in the south. It has, in places, an annual rainfall of over 100 inches (250 cm). Its natural exuberance is apparent in its rich forests and lush tropical vegetation. The **tropical evergreen forests** are remarkable for their luxuriant growth of trees, both tall and medium-sized, which do not as a rule shed their leaves annually. To add to the prolific vegetation, many shrubs, climbers, epiphytes, bamboo and ferns grow in abundance. These thick-set jungles have been utilized by man in several ways. *Hevea* and *Ficus elastica* yield

rubber, while ebony *(Dyospyros)* and toon *(Cedrela)* are good timber sources. The species common here are *Dipterocarpus*, *Artocarpus*, sandalwood *(Santalum)*, red sandalwood *(Pterocarpus)*, nutmeg *(Myristica)*, Alexandrian laurel *(Calophyllum)*, *Michelia, Ternstroemia*, *Hopea* and *Sterculia*. Coconut palms *(Cocos)*, mimusops, talipot palms, thick shrubbery and climbers complete the scene of tropical splendor.

In most areas of the west coast region where rainfall is relatively low (60–80 inches/150–200 cm), vegetation is sparse and consists mainly of deciduous trees. These shed their leaves annually and remain bare after leaf-fall. Mountain ebony *(Bauhinia)*, teak, *Dalbergia*, *Adina*, *Lagerstroemia*, *Terminalia* and *Grewia* form an assortment of trees of many sizes, some with beautiful flowers and others with high-quality



wood. Characteristic of this area is bamboo *(Bambusa)*, which grows in dense clumps. The bamboo here is very long and has a large girth. It is used in house-building and furniture-making.

In the higher ranges of this region, tucked away in comparatively smaller areas, are temperate evergreen forests with *Michelia*, *Eugenia*, *Ternstroemia*, etc.

Dry Lands: In sharp contrast to the green West Coast Region is the **Indus Plain**. This phytogeographical region covers parts of Indian Punjab, Rajasthan, and most of Pakistan. Annual rainfall varies from a low 10–20 inches (25–50 cm) in Rajasthan to 25–30 inches (64–76 cm) in the Punjab. The area suffers from extremes of temperature and low humidity. Winter can be harsh and summer equally unpleasant, with blistering heat and hot winds. The soil has a high percentage of salts and is sandy. A large part of Rajasthan is covered by the Thar Desert, and shifting sand-dunes cause desertification. On the fringes of the desert the vegetation is typically xerophytic, adapted to dry surroundings – with long roots penetrating deep below the earth's surface and enabling the plants to utilize the subsoil's moisture. Such vegetation requires very little water and can survive in extreme climates and tolerate harsh soil conditions. In order to prevent evaporation the leaves are small, the stems greatly reduced, and the pores on the leaf-surfaces few in number.

Left, wild iris and above, rhododendron forest, Helambu, Nepal.

Along the riverbanks there is abundant subsoil moisture although the soil is sandy. Where there is black saline soil there is no vegetation at all. The **desert thorn forests** of this area consist mainly of *Prosopis*, *Salvadora oleoides* and *Caparis*. These grow in isolated clumps. *Acacia*, *Tamarix*, *Albizzia lebbek*, *Morus alba* and flame of the forest are the mixed varieties that constitute such forests. Arabian grass, saltwort and seablite grow where there are salt tracts. The under-growth consists of thorny shrubs.

Dune scrub, which differs from the forest vegetation, also resists desert conditions and is characterized by stunted trees and bushes with adaptive thorns. This vegetation

is found in southern Punjab and Rajasthan. The only tree found here is *Acacia jacquemontia*. Sandy alluvial deposits are found on the banks of the rivers of this region. Dominant here are forests consisting mainly of species like *Acacia catechu* and *Dalbergia sissoo*. Poplars *(Populus)* and *Tamarix* occur here and there.

On the whole, the "Indus region" consists of hardy plants that can protect themselves against trying weather conditions.

Gangetic plain: The vegetation of the **Gangetic Plain** slowly changes from that of the Indus Plain since the rainfall increases gradually as one moves eastwards. This region can be divided into three parts. The upper, dry sub-region extends from Punjab to Allahabad in Uttar Pradesh. It receives 20–40 inches (50–100 cm) of rainfall annually. *Peganum, Acacia, Moringa, Prosopis, Tecoma,*

The third part of the Gangetic Plain is an unusual area forming the vast **Sunderbans** around the delta of the Ganga in both India and Bangladesh. Characteristic of this region are interconnected waterways and marshy swamps. The sea makes its way into the land through a number of creeks. The **tidal swamp forests** of the delta region cover an area of 6,000 sq miles (15,500 sq km), the largest stretch of swamp forest in the world, most of it lying in Bangladesh. The area is thick with evergreen trees and shrubs typical of mangrove or littoral forests, which thrive in the saline water washed in with the tide. Typical mangrove trees like *Rhizophoras*, *Ceriops*, *Kandelia* and *Bruguiera* are prolific in the area. Of the 36 species of mangrove trees found in the Sunderbans, *Avicennia officinalis* is the largest. The little swampy islands found here and there are

Rhus, etc., along with some palms, are found in this sub-region. The vegetation is still quite sparse in the area and, where the soil is alkaline, *Salvadora* is common. This region also has grasslands or savanahs interspersed occasionally with *Bombax*, *Butea*, *Zizyphus* and *Randia*.

In the lower Gangetic Plain, which stretches from Allahabad to West Bengal, the rainfall is 76–100 inches (190–250 cm). *Mangifera, Artocarpus, Ficus, Areca, Borassus, Phoenix, Lagerstroemia, Pterospermum, Bombax, Polyalthia* and *Casuarina* grow commonly in the area. The vegetation grows more prolifically and many different aroids begin to occur. Aquatic plants, several types of grasses and sedges abound in the vicinity of lakes and small reservoirs.

covered with savannah grass. Palms like *Nipa fruticans*, *Phoenix paludosa*, coconut palms and cane *(Calamus)* occur extensively. Elephant grass and screwpine grow near streams, ponds, swamps and canals. The vegetation is thick and many species bind the mud and prevent it from being washed away. Ferns and orchids are also found here. The flora of the Sunderbans is of great interest to the botanist, the infinite variety and uncommon growth conditions making it exceedingly attractive for study. The forests of this area give economic support to the people – firewood and timber being the most important products.

Assam region: The northeastern region of India is exceedingly wet and humid. Annual rainfall varies from 110 inches (280 cm) in the Garo hills

to 510 inches (1300 cm) at Cherra Punji. On the whole it averages at a high 80 inches (200 cm). The region does not experience large fluctuations of climate. The temperature is mild and ranges between 86°F and 68°F (30°C and 20°C). The hills, however, are much colder. Humidity is between 80 and 90 percent. The torrential Brahmaputra river flows right through the Assam Valley, spreading its rich alluvial deposits on the banks. The soil is extremely fertile and all these favorable conditions together result in extraordinarily rich and lush vegetation, making some pockets of Assam the world's richest in flora. Hills and plains have an abundant supply of water and are covered with uninterrupted forests.

The **tropical evergreen** or **rainforests** extend from northeast Arunachal Pradesh to Darrang district in Assam. They also occur in Nowgong, and Cachar districts in Assam and most of the Khasi hills in Meghalaya. The peculiarity of these forests is their three-tier structure. The top tier looms over the rest and consists of isolated, tall, evergreen or deciduous trees, which grow to a height of around 150 ft (46 meters). The most common species among them are *Dipterocarpus macrocarpus*, *Artocarpus*, *Chaplasha*, *Tetrameles* and *Terminalia*, each growing tall and handsome, with spreading branches and abundant foliage. The middle tier consists of several medium-sized trees growing up to a height of about 80 ft (25 meters). *Colophyllum*, *Mesua*, *Amoora*, *Cinnamomum*, *Phoebe*, *Machilus* and *Duabanga* form the mixed middle layer. *Ficus elastica*, *Michelia*, *Magnolia* and *Schima* are also found. The ground tier consists of shrubs and climbers, orchids, aroids and ferns that cover every inch of land.

The pine forests of the Khasi hills, however, are devoid of the brush that gives the forest elsewhere its dense cover. Other trees present here mixed with pine are oak *(Quercus)*, *Pieris*, chestnut *(Castanopsis)* and birch *(Betula)*. In other areas, yew *(Taxus)*, spruce *(Picea)*, silver fir *(Abies)*, deodar or cedar *(Cedrus)*, Tsuga, cypress *(Cupressus)* and juniper *(Juniperus)* occur. Pines, yews and *Tsuga* are the few varieties that survive at very high altitudes.

In the lower Assam Valley, in the Garo hills and North Cachar hills, there are sal forests that

are mainly of the deciduous type. Scrub forests also occur here and are dotted with colorful trees like *Lagerstroemia*, *Cassia fistula*, *Bombax*, *Sterculia* and others like *Schima wallichii*, *Careya arborea*, *Dillenia*, *Kydia*, *Albizzia*, *Gmelia*, *Alstonia*, Walnut, *Terminalia* and *Dalbergia*.

In certain parts of this belt, the forests are strikingly different, as they are pure sal forests, consisting of a variety peculiar to the region *(Shorea assamica)*, which grows to a height of 100 feet (30 meters). These unmixed sal forests present a beautiful and eye-catching picture.

In the dry regions of Cachar, forests are heterogeneous, consisting of *Dipterocarpus*, *Adina*, *Bombax*, *Stephegyne*, *Ficus* and *Cassia nodosa*. Bamboo and several grasses are common. Colorful

Left, colorful leaves, Langtang and above, sal forest, central India.

flowering shrubs provide an attractive ground cover – white *Coffea bengalensis*, blue *Strobilanthes*, white and yellow *Mussaenda* and scarlet-red *Holmskioldia*.

Assam is unique and is unparalleled in the variety and richness of its forest wealth. In the swampy regions of the Assam valley, aquatic and semi-aquatic grasses and aquatic ferns of many varieties are prominent. The flowering plants that occur commonly are *Euryale*, *Alpinia*, water lilies *(Nymphaea)*, and lotus *(Nelumbo)*. Among the trees, *Barringtonia*, *Cephalanthus*, and some *Ficus* species are seen here.

Another variation in the vegetation of Assam occurs in the low-lying areas that have very little rainfall. Along the riverbanks are very tall grasses, whereas the dry lands have short and sturdy varieties.

In the foothills of the Bhutan range, extending from Goalpara district to Darrang district, are the **riparian forests** that grow along large streams and are composed mainly of two tree varieties, *Acacia catechu* and *Dalbergia sissoo*. The few others are mostly of *Duabanga*, *Bombax*, *Trewia*, *Barringtonia*, *Salix*, *Anthocephalus*.

In the northeast region, there is another interesting occurence among the flora – carnivorous plants and parasites abound. Over four hundred species of orchid and innumerable varieties of fern, and even fern trees, are special to this region.

Himalayan Flora: The vast area covered by the magnificent Himalaya mountain range lies to the extreme north of India and includes Bhutan, Nepal and parts of Pakistan. On the basis of climatic conditions, the Himalaya can be divided into three fairly distinct regions: the **eastern Himalayan region**, extending from the Arun Valley in East Nepal to the Mishmi hills of Arunachal Pradesh, has an average precipitation of 120 inches (300 cm) a year. The next division, namely the **central Himalayan region**, is demarcated by a sharp decrease in rainfall, and comprises chiefly Nepal and Eastern Uttar Pradesh in India. The third division, the **western Himalayan region**, originates in Peshawar in Pakistan, where the annual precipitation is 20 inches (50 cm) and extends in a southeasterly direction towards the Kumaon hills in Uttar Pradesh, with the precipitation increasing gradually to approximately 40 inches (100 cm) in Kumaon.

It is, however, important to note that it is the altitude determining the temperature of an area that is the most important factor contributing to regional variations in the Himalayan flora. Because of this, the three divisions mentioned, can, in turn, be split up into zones, according to differences in altitude, running in a northwest to southeast direction across the whole expanse of the Himalaya. These divisions and zones, however, often do not have well-defined boundaries, due to an inevitable overlapping of vegetation types.

The **tropical zone**, with rainfall of 40–60 inches (100–150 cm), lies south and east of the Himalayan foothills, and is locally known as the *terai* region. The thick forests of the *terai* can be divided into two types, according to variance in rainfall – areas having an annual rainfall of over 100 inches (250 cm) support evergreen forests, whereas deciduous forests are found in regions where the rainfall is sparse.

The **temperate zone** of rainfall 60–140 inches (150–350 cm) is otherwise called the **coniferous zone** due to the predominance of conifers. This zone has abundant flora and exhibits a decrease in vegetation with an increase in altitude.

North of the coniferous zone lies the **alpine zone** where the harsh temperature and rainfall (140–180 inches/350–450 cm) conditions support only a meager plant cover. This region stretches from above the tree line to the permanent snow line.

The eastern Himalaya is populated with varied and profuse flora. Over 4,000 species of flowering plants and a few hundred varieties of ferns make it a richly vegetated area. Amongst the conifers, the predominant species are many varieties of pine *(Pinus khasya, P. excelsa, P. longifolia)*. Himalayan silver fir, junipers, *Podocarpus* and *Picia* are also common varieties. Growing abundantly here are several species of rhododendron adorned with flamboyant blossoms. *Berberis* , *Impatiens* , *Saxifraga* , and Himalayan poppies are a few examples of the numerous flowering plants of this region. Adding to the lush vegetation are orchids, bamboos, palms, epiphytes and creepers.

The common conifers are found in many varieties of pine and juniper. *Pinus longifolia*, *P. excelsa* and *P. gerardiana* are the predominant varieties of pine, while *Juniperus communis* and *J. recurva* are the common junipers. The mixed species found in this region are *Abies pindrow*, cypress *(Cupressus torulosa)*, deodar *(Cedrus deodara)*, *Picea morinda*, etc. The exuberant growth in the east formed by rich flowering plants, orchids, palms and bamboo is far from being equalled in the western region. The variation in the two regions is apparent in the fact that the epiphytes and creepers that form an important part of the eastern forests are in quite insignificant numbers here, whereas grasses and leguminous plants are comparatively common due to the drier climatic conditions. Although rhododendrons are found here, the number of species is considerably less than in the eastern Himalaya. *Rubus*, *Rosa*, *Prunus*, *Pyrus*, *Ranunculus*, etc., form the vegetation of the upper reaches.

Teak forest, Mudumalai, South India.

THE TIGER

The tiger, unlike the lion, is a predator that relies on cover for success in hunting. Again, unlike the lion, it leads a solitary life. The only associations that occur are between male and female during the short courtship period and, of course, the long association between a mother and her cubs, till the latter grow and they can fend for themselves. Young siblings, on parting company with their mother, may sometimes stay together in an area for a few months, but soon tensions develop among them that break up the company. Socialization is extremely rare and is generally limited to a young adult occasionally visiting its mother who is now caring for her next litter. Such a gathering may take place at a kill, but is invariably shortlived – a day or two at the most.

The parental care and upbringing of the young is the responsibility of the mother alone. This solitary way of life and the stalking or ambushing strategy of hunting is the only way food can be secured by a large predator in a forest environment or one with plenty of other forms of cover, such as the tall, dense reeds of the *terai* grasslands. Communal hunting by a large predator, as in the case of lions, depends upon fair visibility and lack of obstructions, a situation not available in a closed forest environment. It is for this reason that the tiger and lion are mutually exclusive in their distribution, the two having adapted themselves to forest and savannah environments respectively. The past and the present distributions of the tiger and lion in the Indian subcontinent, where alone both the species occur, bear testimony to this.

Habitat and population: Having originated in Siberia, as suggested by fossil evidence, the tiger found its best home in the Indian subcontinent. It is a truly Asian animal and science recognizes eight subspecies, two of which (the Caspian and Balinese) are already extinct. The other six are the Siberian, Chinese, Indo-Chinese, Indian, Sumatran and Javan. Body-size diminishes as the distribution advances from the cold Siberian scrub thickets to the multi-tiered evergreen forests of Java and Sumatra. On the Indian subcontinent the tiger is at home in a variety of environmental situations, from the high-altitude, cold, coniferous Himalayan forests to the steaming mangroves of the Sunderbans delta, from the swampy reedlands of the *terai* to the rugged, scorched hills of the Indian peninsula, and from the lush, wet evergreen forests of the northeast and the south to the scrub-thorn arid forests of Rajasthan.

Preceding pages, Ranthambhore Tiger Reserve, Rajasthan. Left, tiger as often observed.

An estimate placed the population of tiger in India at the turn of the 19th century at 40,000. While this could be an exaggeration, the present plight of the tiger became evident when, in 1972, an all-India tiger census revealed that a population of only 1,800 had survived. The history of the decline of the tiger is the pathetic story of the shrinkage and ravaging of the Indian wilderness, pressed forward by the thoughtless onslaught of demographic pressures that followed the promptings of immediate expediency and failed to take account of the doubtful sustainability of the changed land use.

The hunters of yesteryear regarded the tiger as the symbol of India's wilderness. Its savage beauty and might and its ability to melt into the forest like a phantom not only whetted the hunter's spirit of adventure but also provided the base for countless juicy *shikar* stories. But, more importantly, the tiger justifies itself ecologically as reflecting in its own level of welfare the health of the country's wilderness. The tiger is the ultimate consumer in the complex food web in many of the forest ecosystems of India. The soil fertility in these ecosystems rests on the micro-organisms that decompose the plant and animal residues to form humus. The diverse vegetation so supported is the food of a thriving community of herbivorous insects, birds and mammals and also helps to conserve the soil and enhance water flow.

Among the terminal carnivorous users of this productivity, the tiger stands at the head. Conservation of the tiger in its natural environment can be achieved only by total conservation of the wilderness based on an ecosystem approach, as has been established by India's Project Tiger. Truly, therefore, the status of the tiger in India is the index of success, as a whole, in conservation of its wilderness.

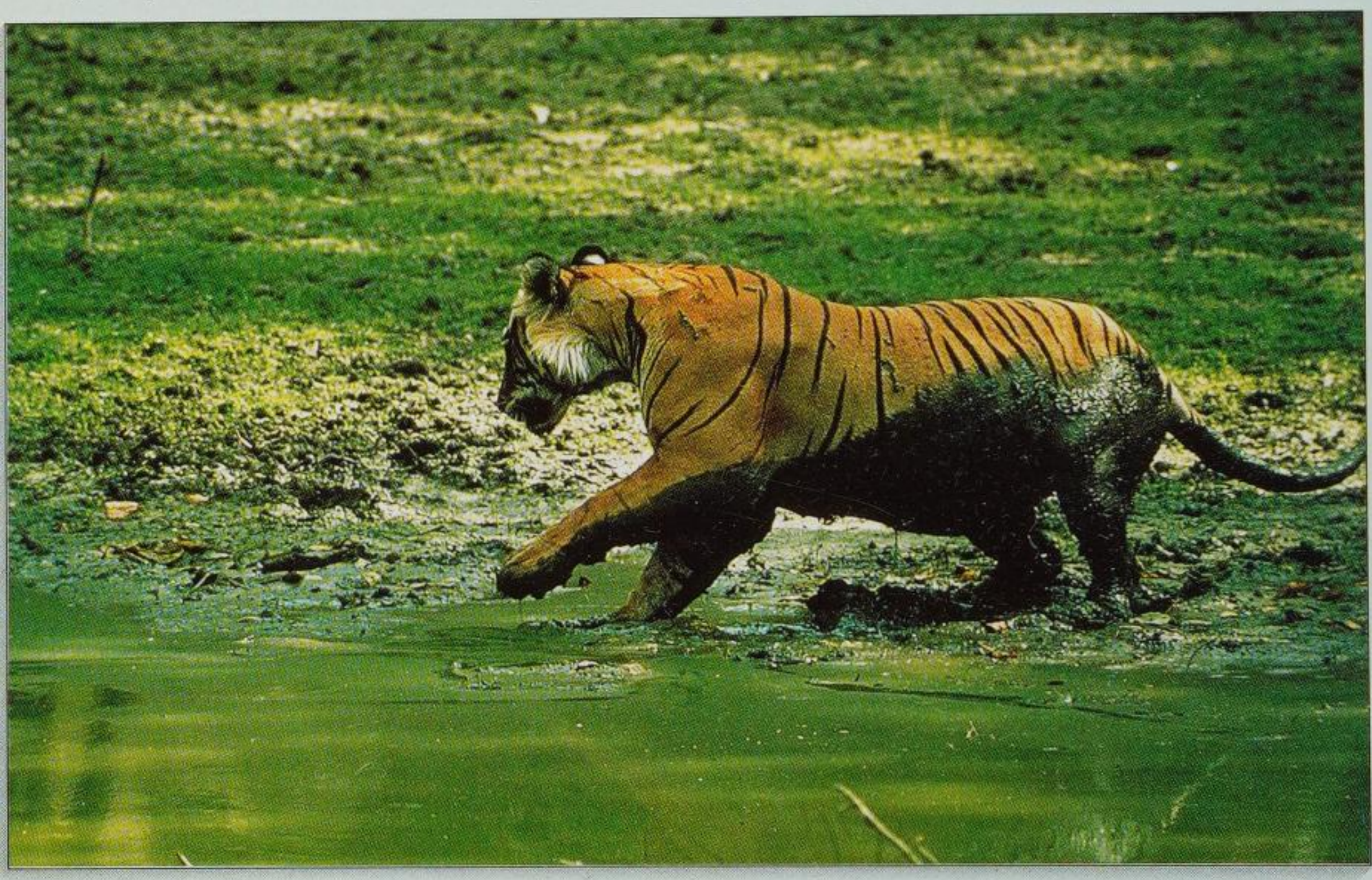
Fortunately, spurred on by Project Tiger, India did embark on a massive conservation effort covering over 300 national parks and sanctuaries accounting for over 12 percent of the country's total area under forests. A very large number of these protected areas harbor the tiger. Initially (by 1984) their number had gone up to 4,000, but present-day estimates put the population at below 2,500 – largely die to the pressures of poaching.

Cunning predator: Even in areas of prey abundance, the tiger has to work hard for its food since all its prey species have highly evolved systems of self-preservation that the tiger must beat. The ungulates, the hoofed herbivores, which constitute the main food of the tiger, have a highly developed sense of smell and reasonably keen senses of sight and sound. Whether living singly

(as the sambar do) or in herds (like the chital, nilgai and gaur), they are constantly vigilant as they move, forage or rest. Herd security and leadership is provided by the matriarchs who keep a close watch while the herd is foraging or resting. They constantly shift their muzzle to face the breeze in order to catch scents and funnel their ears in different directions to catch sounds. On apprehension of danger, the first alarm is signaled by stamping a forefoot. If, on further assessment, the danger seems real and imminent, a vocal alarm is sounded. Finally, the matriarch provides the lead and the herd drifts, scampers or bolts. Different species of deer have their distinctive alarm calls, which are heeded by *all* the prey species. Langur and monkeys, from their superior position in trees, also constantly observe and notify the presence and movements of predators

intermittently. The tigress took 35 minutes to come within 20 yards of the small chital herd. Then, in a split second, in a couple of lightning leaps, she pounced on the stag, killed it instantly and dragged it further into the bush.

On another occasion a limping tigress was offered a tethered buffalo calf to help her survive the temporary disability. The buffalo was walked to within 246 ft (75 meters) of the tigress, being herded there by three elephants. It was then tethered to a bush in full view of the tigress. The buffalo, however, remained ignorant of the tiger's presence. As soon as the elephants and the park staff moved away, the tigress who was already on sharp alert, moved in an out-flanking stalk, taking cover of shrubs and grass clumps. Her movements were observed from elephant back. Stretching her body in a low posture her advance was in



by calling out in alarm. In order to beat their vigilance, the tiger takes to stalking behind cover, treading silently. It approaches its quarry against the direction of the breeze so as to avoid detection by smell.

A young tigress was once observed sitting on a high rock in a clearing in a sal forest for over half an hour. Hearing the mating call of a chital stag, it became alert and sensed the direction of the call by funneling its ears, but did not move. When the call was repeated after a couple of minutes, it gently got down from the rock and moved very slowly towards the chital, which were about a hundred yards (100 meters) away. Her movements could be discerned only from a slight quivering of the bush. The stag kept calling

the slowest possible slow motion, carefully taken silent measured strides, zig-zagging so as to remain in cover. She took more than 20 minutes to cover those 60 yards, and when she came to within about 15 yards, she waited for almost two minutes behind a grass clump, the buffalo still oblivious of the tigress's presence. Then in a lightning outburst she was on the buffalo's neck, burying her sharp long canines into it. The buffalo could not even emit a shriek and fell to the ground under the weight of the tigress. She clung to the quarry for well over two minutes, until all movement ceased and the buffalo died of suffocation. The tigress herself was exhausted. She sat panting beside the kill for half an hour, went to take a drink of water and began to feed only an hour later.

A tiger usually takes its quarry from behind, laying its chest on the back of the animal, grabbing the neck in its canines, sometimes bracing a forearm on the forelimb of the quarry and trying to pull it down by their combined weight. As the prey falters, the tiger usually gives an upward jerk to the neck and is sometimes able to break the spinal cord, killing the prey instantly. Alternatively a common method is to keep the prey pressed under its weight and hold onto its trachea, preventing breathing. Even experienced *shikaris*, having often seen tigers in this posture, believe the tiger to be sucking the blood of its victim. This cannot be true because its long canines and short lips do now allow the tiger, and most other feline and canine predators, to create a vacuum in their mouth to enable them to suck. It is for this reason that all cats and dogs have to lick and lap up water.

food secured. Depending on the size of its kill, the tiger may feed on it for four to five days, without taking note of the stink of the putrefying meat. By the end, it may have fed on all the flesh, small bones, skin and hair: the hair acts as roughage and helps in digestion.

The tiger's choice of quarry is not chosen by species. It is, rather, by size – the bigger the better. With very large prey, e.g. the gaur or the buffalo, the tiger goes for the subadults. When a tigress is training her cubs, regardless of size, many monkeys and langur are killed – the only form of communal hunting seen among tigers.

Tigers are powerful swimmers and are in full command in the difficult tidal-swamp and mangrove habitat of the Sunderbans, where they feed a lot on fish, sea-turtles and water monitors, in addition to chital and wild pig.

The tiger's formidable and sharp retractile claws play a significant role in capturing and holding on to its quarry. A might swipe of the forearm is sometimes used to stop a fleeing animal or to kill very small prey like monkey or peafowl. The tiger starts feeding from the rump and hind legs and, as the stomach cavity of its kill is opened, by a neat surgical operation, the tiger removes the intestines and the stomach and then feeds on the fleshy organs in the cavity. It does not feed on the rumen and the viscera. Its rasping tongue enables it to remove flesh from the large bones and proves useful in clean and complete utilization of the

Left, tigers often cool themselves in water and mud and above, resting after a meal.

Occasionally the tiger gets a windfall. Once in Kanha, a massive gaur bull easily more than a ton in weight became sedentary, lounging around a water pool in a dry stream bed, foraging on the grass growing there. Its movements were seemingly constrained by old age, as there were no visible signs of disease or injury. For over a fortnight the bull was observed at the pool, its ambit progressively shrinking. It was photographed from the ground with a tripod-mounted camera. Every day, the pugmarks of a young tigress resident in the area were seen in the vicinity. One day from these marks, it was evident that the tigress had even stalked and approached the bull. It was apparent, however, that the tigress was not able to muster up the courage to attack the

huge gaur, which might have snorted and scared her away with his formidable horns.

Finally, one evening, the bull became stationary at the edge of the pool and did not move at all even at the passage of vehicles on the road barely five yards from the pool. Early next morning the bull was gone, dragged by the young tigress some 50 yards away into bamboo thickets, up above the six-foot (two-meter) high bank. From the marks on the carcass it was evident that the helpless bull was brought down by hamstringing and was probably dragged up the bank even before it died. After a week, when the kill was abandoned by the tigress and her two six-month-old cubs, there was still plenty of food left for the scavengers. The amazing side of the episode is the evidence it provides of the enormous strength of the tigress – she probably weighed no more than 330 pounds (150 kg) whereas the bull must have weighed over a ton.

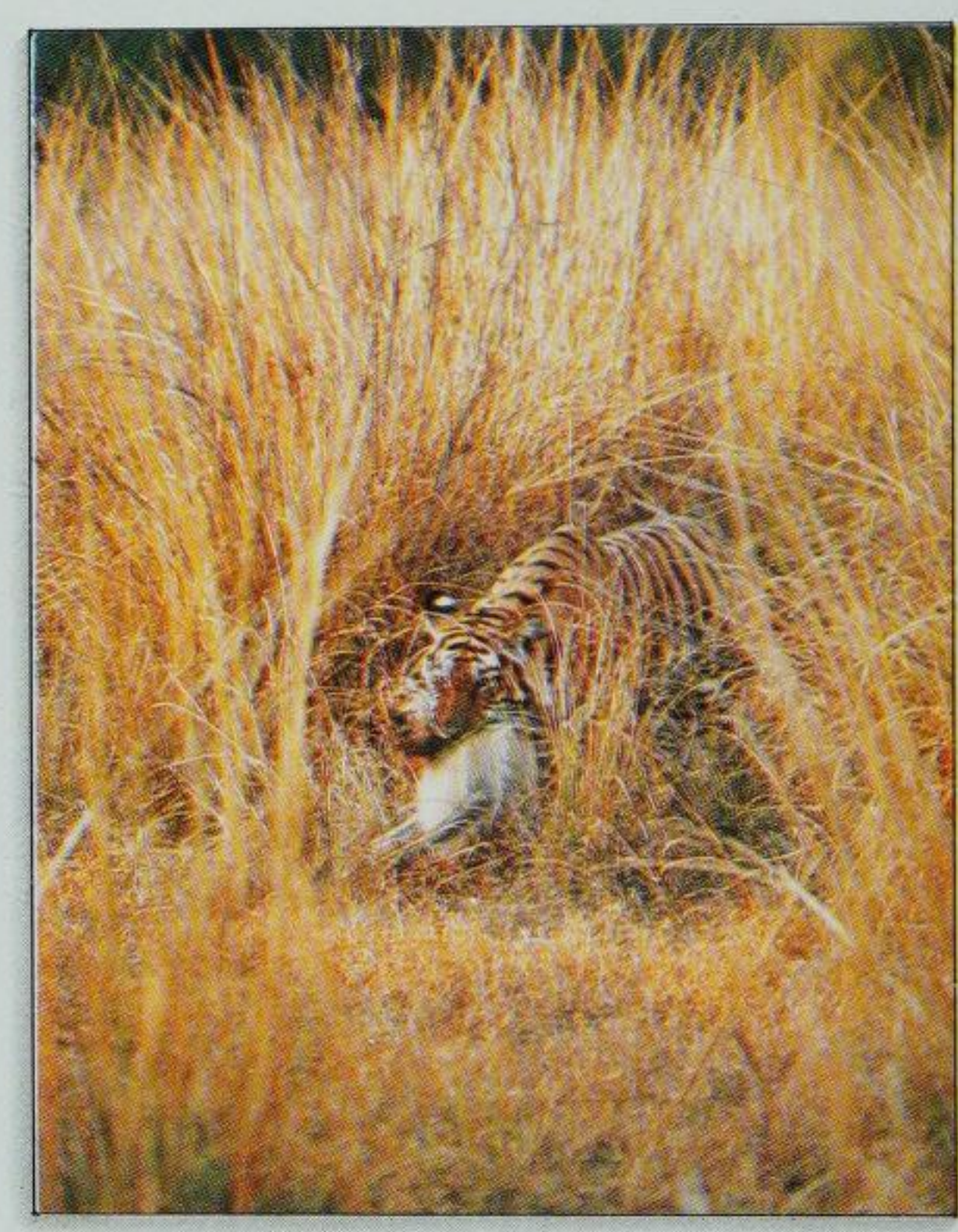
A tiger may feed on an average size kill (e.g. chital) for a day or two and then may not hunt for two or three days. It usually hides its kill under cover and tries to remain nearby to protect it from scavengers, particularly vultures who, once they detect it may descend in hordes and polish off the kill in half an hour if the tiger is not around.

An average-size tiger may kill up to three average-size prey every two weeks or about 80 every year. Depending upon the quality of habitat, a tiger would need a base population of 300 chital to sustain itself without upsetting chital demography.

Devoted mothers: Tiger cubs are tiny; blind and helpless when they are born. But a tigress is a loving mother and brings up her cubs with great care and effort. Despite this, usually only two make it to adulthood from a normal litter of six. Until they are about three months old, the cubs are not allowed to trail the mother and food is brought to them. Their lair has to be frequently shifted, because if detected, they may be killed by other predators and scavengers, and even by rival male tigers. They are trained and disciplined to be quiet while the mother is away on hunting errands. A carefully worked-out scheme of vocalization further guides the cubs to lie low or to respond and come out to meet the mother.

The cubs' first lessons in hunting consist of learning to pounce on their mother's tail, which she shifts to dodge them, and playing hide and seek with her. They learn to stalk by searching for mother who hides under cover, and practice by stalking each other. Training hunts take place in bushy cover during daytime, pursuing deer fawns, langurs or monkeys foraging on the ground. The cubs are taught to keep clear of man, the most crafty of all predators.

A tracker employed in a park once went surveying for water holes during the dry season. As he peered over a pool from a *nullah* bank, he was charged by a young tiger. The height of the bank allowed him just enough time to scramble up a slanting tree on the bank. From there he could see the young tiger's mother with two more cubs, lying in another pool nearby. The cubs were about a year old and too grown up for the tracker's comfort. The young tiger repeatedly came charging up the thick slanting stem, but could not reach the man. The mother beckoned the cub by calling, and when he did not give up, she got up and moved towards the cub. Thereupon the young tiger thought it prudent to obey and joined his mother. All four then disappeared into the bush and the man safely walked back to the park headquarters to recount the tale, which was verified from clear pugmarks on the ground and claw marks on the tree stem.

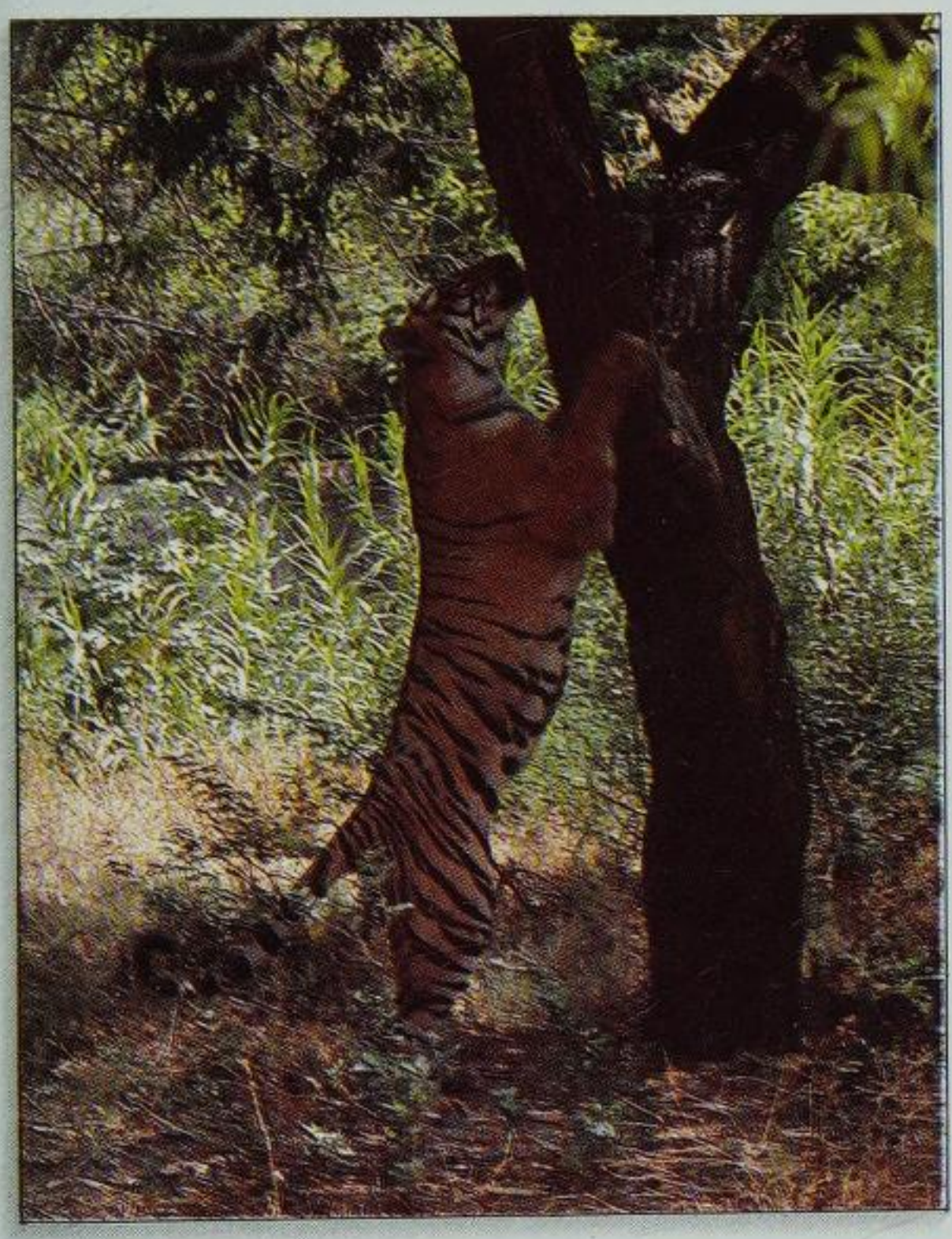


Survival of the fittest: Social organization among tigers varies with the quality of habitat in a given area, the determinant of quality being the relative abundance of prey and optimum hunting cover. In a high-prey- density area, the territorial definition of land tenures is prominent. In such an area, the dominant males occupy very extensive territories, as large as 20 to 40 sq miles (50 to 100 sq km). Up to three or even five females may occupy mutually exclusive sub-territories within a large male territory. The females in such an organization are assured of food supply for themselves and their progeny and, in return, owe allegiance to the territorial male. This also affords protection to their cubs from rival males as the territorial male meticulously demarcates and jealously guards his

territory against rivals. Such a high-prey-density area in a region thus serves as the main natal area with most of the breeding taking place there. Moving radially away from the natal area, as the prey-density declines, the territorial definition also becomes less rigid.

The young cubs stay under the care of the mother for anything from 1.5 to 2.5 years, whereafter they are compelled to leave the natal area. But a young tiger is seldom able to find a place in the adjacent medium-prey-density areas because of their firm occupation by either the past-prime adults recently thrown out from the natal area, or the pre-prime adults preparing to find a foothold there.

Thus a young tiger dispersing from the natal area may be required to travel far and may, in fact, remain transient in the low-prey-density peripheral



area for a long time. If contiguous tiger habitats are available, such a dispersing sub-adult may never return to its natal area and may in fact join another nearby population, thus ensuring the exchange of genes so essential to the viability of the population of a long-ranging, major predator like the tiger.

Males demarcate their territory by spraying scent with their urine on prominent trees on their territorial boundaries. They also often deposit their scent on the underside of the drooping branches of low bushes. This way the scent lasts longer, preserved from excessive evaporation or from being washed away by rain. Another and simultaneous way of marking territory is to make scrapes on the ground and tree trunks with the paws and then to deposit a foul-smelling secretion from the anal gland. These markings are intelligible to the other tigers and are recognized. Territorial integrity is further maintained by frequent patrolling.

The females also mark their territories in the same manner, but not as frequently or meticulously. The intensity of scent markings by a female becomes very high when she is in estrus and ready to have a mate. Her physiological condition is advertised by this scent and helps attract the males. The courtship period usually spreads over a week or 10 days, but the actual mating period may be only two to three days, during which copulation is frequent. Such prolonged association of the courting pair is necessary among cats in whom ovulation is promoted by frequent copulation.

The gestation period in the case of the tiger is short, being about 105 days. Because the tigress, even during the terminal days of her pregnancy, has to hunt for herself, nature has ensured that her pregnancy does not disable her from doing so. It is for this reason that the gestation period is so short, the fetal size at birth small, and the stage of development of the cubs, when they are born, rather low. In order to provide against likely losses in rearing from this low developmental stage at birth, the litter size tends to be large – up to six cubs.

Both the males and the females occupying the natal area are prime members of a population and such occupancy of prime habitats by prime adults is indeed a corollary to the axiom, "survival of the fittest." This ensures that only the best animals of both sexes are able to breed. Expectedly, therefore, confrontations take place among dominant tigers, particularly males, in order to establish supremacy and possess a territory. Such confrontations may range from a skirmish to a serious fight, depending upon the match between the contenders. All-out fights are by no means uncommon and very serious and deep wounds may be sustained. Such grievous wounds may not heal and may eventually cause death after a few days or even weeks.

However, tigers are generally able to heal all their wounds by licking them. Where direct licking is not possible, they manage to reach the spots and apply saliva by first depositing it on one of the limbs, usually a forearm, and then wiping the injury with the limb. It is those injuries on which saliva cannot be applied and those that are too deep and grievous, that prove fatal. Usually, in the natal area a wounded tiger may be helped by another tiger, a mate by its mate and a mother by her young.

Left, tiger with langur kill, Ranthambhore, Rajasthan and above, clawing tree to sharpen nails.

In one case, a huge territorial male was observed over the carcass of an only slightly smaller male he had killed in an encounter. The former cannibalized and persisted on the kill for four days, in much the same manner as he might persist over a herbivore kill. The intriguing aspect was that the killing was not made by the conventional method. No canine marks were seen on the neck or the nape of the carcass. It appeared that the smaller male had intruded into the territory of the larger male in the belief that the latter was away from the intruded segment of its territory. Nevertheless, the presence of the smaller male was probably advertised to the territorial male by the alarm calls of langur or the deer and this alerted the territorial male and brought him out in search of the intruder.

Suddenly confronted with the territorial male, the intruder may have offered submission, which the territorial master was not magnanimous enough to accept. He probably therefore took the intruder by surprise by holding his head between his forepaws and twisting his neck with a vicious jerk, snapping the spinal cord.

Even subadult males are not tolerated and there have been numerous other recorded instances of half-grown cubs having been killed and partly eaten by the territorial male. Tigers are also known to kill and eat leopards. However, such internecine fights should not be regarded as being in quest of food, even though the killed animals may have been eaten. It should also not cause excessive worry in terms of loss of a member of a rare and endangered species. In nature, this is the only means of auto-regulation of the population of a supreme predator.

Cattle-lifters and man-eaters: Tigers are often maligned for their aberrant behavior, reflected in their lifting cattle and sometimes killing and eating people. Though such behavior cannot be tolerated, invariably it is disturbance or damage to the tiger or its habitat that induces or compels it to act in such a manner. As already mentioned, the tiger, by training and instinct learns to avoid man. However, when a wildlife habitat is degraded, causing a reduction in the population of natural prey, tigers are driven to occasionally taking cattle. This may lead to conflict between humans and tiger and there may be situations when, while being chased away from a livestock kill, a hungry tiger launches an attack on people to prevent such deprivation. A few such instances may embolden a tiger to take to man-killing and man-eating. Also, there are sometimes attempts by people to avenge livestock killing by shooting at tigers. Often such attempts only end in wounding or injuring a tiger who, partly out of vengeance, and partly because of its inability to kill free-ranging wild prey because of the injury, instead goes for cattle or even humans.

In a policy statement, the Government of India has permitted destruction of proven man-eaters, while providing compensation to owners of the cattle killed. At the same time, attempts are underway to rehabilitate habitats for the tiger both in the protected as well as in other forest areas.

Identification: Each tiger has a pattern of stripes and facial markings unique to itself and individuals can thus be identified. While such identifications by visual or photographic confirmation are usually employed in long-term behavioral studies in a given area to great advantage, counting tigers by this method is not practicable in large areas. The tiger's partiality to cover, its nocturnal habits, unpredictable movements and generally secretive behavior do not allow repeated sightings or photography, especially of all individuals in an area. The standard and practical method of counting tigers is to identify individuals by their pugmarks – a method equally capable of near mathematical accuracy.

Features in a pugmark, e.g. the shape and relative size of the right, left or bottom lobe of the pad, the top edge of the pad, the relative sizes and placings of the toes with respect to the pad and several other features vary from tiger to tiger. An individual can be identified from a study of a combination of these features unique to itself, ascertained replicably, from frequent tracings of pugmarks recorded in the field.

Conservation of the wilderness has come to stay in India, accepted on ecological merit and endorsed by the traditional values of esthetics, culture and religion. Important statutory, regulatory and restorative measures have benefited a host of species and their habitats in a number of tiger reserves, national parks and sanctuaries. Some of the best places to see the tiger are Kanha and Bandhavgarh in Madhya Pradesh, Ranthambhore in Rajasthan, and Corbett and Dudhwa in Uttar Pradesh. Other unique tiger habitats with a fair chance of encountering one on excursion are Manas and Kaziranga in Assam and Nagarahole and Bandipur in Karnataka.

Nepal, like India, has taken remarkable strides in wildlife conservation. Its Royal Chitwan National Park is a fine example of tiger conservation in action.

Family meal: An account of a night-long observation, in the light of a full moon, of a tigress caring for her young would be an apt epilogue to this essay on the tiger. A well-hidden sambar kill by a tigress was located along a *nullah* in Kanha. A makeshift, thatch hideout was erected across the *nullah*, about 50 yards from the bush where the sambar carcass was lying hidden. Nothing remarkable happened until two hours after dark, when the copious chital alarm calls signified the approach of a predator. The tigress appeared in the *nullah* bed some 15 minutes later, leading

towards the kill. After inspecting her kill, she sat alongside the bush for another 15 minutes – a picture of beauty, moonlight glinting in her bright eyes – apparently assessing the security environment for her cubs. She then rose and disappeared into the forest. An hour and a half later, sambar and barking deer alarms were heard in the distance. The tigress reappeared on the scene in another half an hour and patrolled the *nullah* bed up and down for about 15 minutes. Then, standing near the bush where the sambar carcass lay, she gave two short, low calls. Presently came an equally short and muted response, apparently from the cubs. The tigress then again went into the forest and reappeared at the edge 10 minutes later. Having reassured herself after a brief survey of the scene she beckoned the cubs by a barely audible call.

Two very young cubs, the size of a large domestic cat, came out and skirted around the mother, rubbing themselves on her flanks, as if nudging her to take them to the kill. The tigress then went inside the bush and dragged the kill out and took a few bites, not so much as to feed but to expose fresh tender flesh for the cubs to eat. The cubs fed on the carcass for about 15 minutes whereafter the tigress again helped them, by opening up fresh meat. After a little while, the cubs having satiated themselves came to the mother. She licked them as if demonstrating to them how to clean themselves.

The cubs then indulged in a bit of cleaning by themselves. Later they became very playful and the three engaged in a mutual display of affection by licking, rubbing and fondling each other's bodies. The mother would beat her tail from one point to the other and the cubs would pounce on it and try to grab it. Occasionally the cubs would come up on the low branches of the trees on the bank and then jump down into the sand below. Such play went on for most of the night. In the early hours, the tigress herself fed on the carcass for over an hour and intermittently the cubs joined her. At least an hour before sunrise, the tigress disappeared into the jungle with the cubs, and until sunrise there was nothing more to it. As the morning sun peeped over the tree line, the moist sand in the *nullah* provided evidence in its markings of the love of a devoted mother for her offspring.

Tranquilizing darts used in research.

☆ ☆ ☆ ☆ ☆

Tiger population: India is the only country that undertakes an annual census of its tigers.

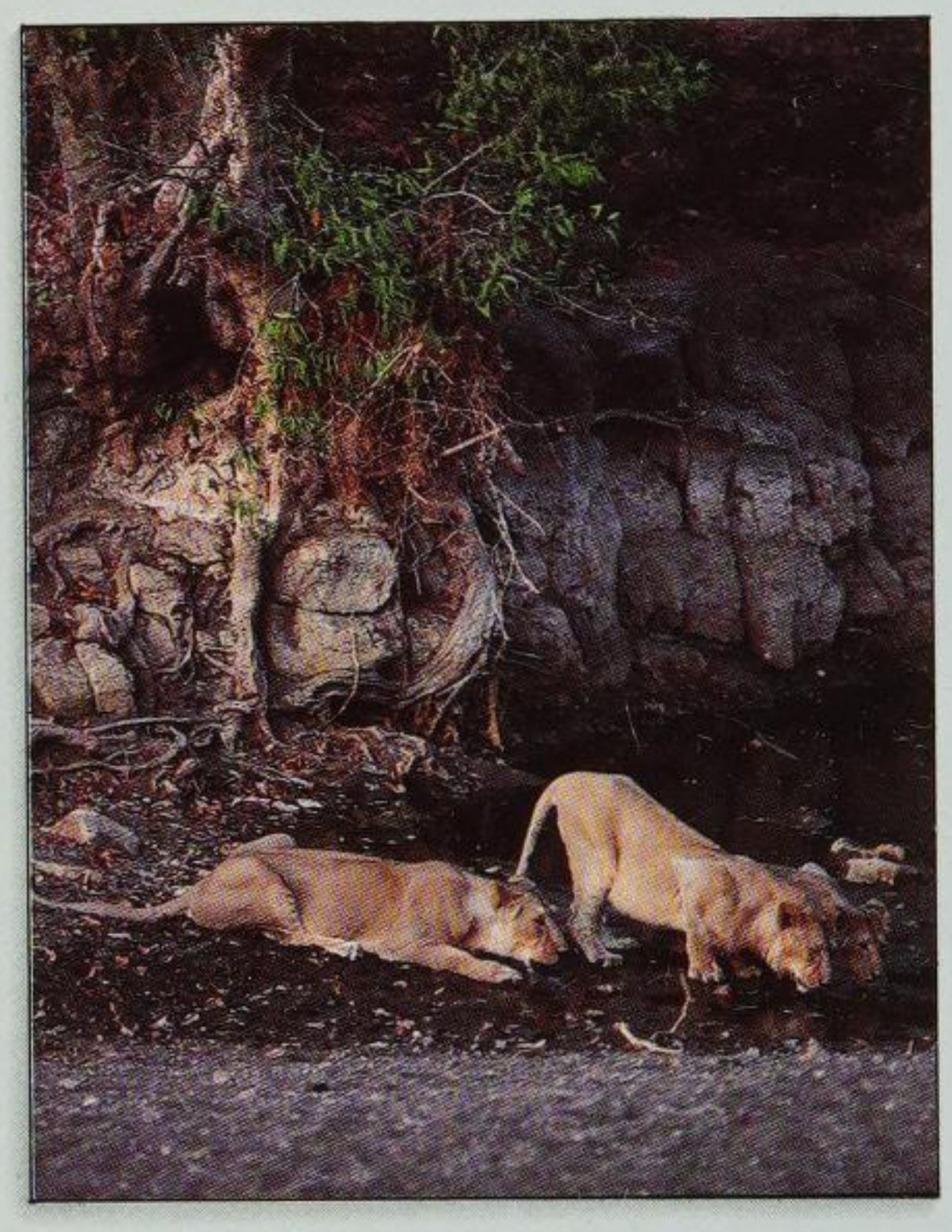
The most recent figure is a little less than 2,500, which compares favorably with 1,800 announced in 1972, although a long way down on the 1986 figure of 4,015. The figures from other countries are largely guesswork.

The Bengal tiger and Indo-Chinese tiger are both found in Burma (Myanmar) (the Irrawaddy river is supposedly the divide).

The Balinese tiger is extinct; the Caspian tiger is probably also extinct; the Javan tiger is reduced to a few individuals. The total world tiger population is estimated at less than 6,000 animals.

LIONS, LEOPARDS AND LESSER CATS

The **Indian** or **Asiatic Lion** *(Panthera leo persica)* is the lion that has figured in history, distributed as it was within historic times from Southern Greece in the northwest to Palamau, Bihar, in India in the east. Separated from the African and the extinct Barbary lion by the breadth of the Sahara, the Indian, West Asian or the Persian lion, the common name depending on its area of occurrence, disappeared by the beginning of the 20th century from all areas of its distribution except the Gir Forest in Saurashtra, Gujarat, in India. The disappearance of open grass and scrub forestlands under the plow, the increase in pastoralism, better arms for the hunter and the subsidence of political



turbulence and settlement of human communities throughout its erstwhile range of distribution was the main cause of its wide-ranging extinction.

The Indian lion is a shaggier creature than the more well-known African lion. The coat and the belly fringe are denser, and the elbow and tail tuft longer. A character that is invariably present in the Indian lion is a distinct belly fold. In size, the average measurements compare favorably with that of the African lion. The record Indian lion measured 9 ft 7 inches (2.92 meters) as against the 10 ft 7 inches (3.23 meters) for the African lion. However, the Indian lions measured are from a tiny fraction of territory when compared with the extensive range of the African lion.

Though in general habits and behavior the Indian lion differs little from the African, there is one significant difference that is perhaps the key to the survival of the small population presently living in the Gir Forest. This vital behavior pattern is the tolerance of humans by the Indian lion. During the several decades that lion and people have lived together in the forests of the Gir there have been remarkably few willful instances of aggression by the lion. Although they avoid inhabited areas during the day they are remarkably fearless of humans and will permit their near approach before moving off with dignity. Living with the lions in the Gir are the Maldhari and Rabbari herders of cattle and buffaloes whose *neses* or villages bear a close resemblance to African villages, with their thorn *bomas* to keep lions out. Lions live largely on the cattle of these forest villages rather than the wild ungulates such as the sambar, chital, nilgai and wild boar. They also take whatever they can kill including goats and camels.

The Gir lion is a gregarious creature and prides often hunt in concert to separate and drive the selected prey to other members of the pride lying in ambush.

Males often live in pairs, the association usually one of long standing; instances are known of such pairs being seen together for several years. The Indian lion has not been sufficiently studied to understand the territorial system occuring among the prides.

During the day, the lions lie up in cover near a water hole or stream or in the shade of spreading banyan trees or within the dense cover provided by the evergreen Carissa, which stand out in summer as islands of green in the starkly desolate forest of bare and gaunt trees. They come out to hunt at dusk, skulking near the outskirts of the villages as the cattle are driven home, to try and pick a stray cow or buffalo. Often the male spends much of the night roaring. The females are much more circumspect. Lions, however, are noisy animals, especially when mating. October and November are the main mating months and the cubs are born in January and February.

The Gir Forest, the last home of the Asiatic lion is itself a relict, being the only patch of extensive forest in the Saurashtra Peninsula. As the only forest of any extent in Saurashtra, it is of considerable importance not only as the home of the lion but also for its effects on the climate and water table of the surrounding districts.

The Gir Forest, to which the Indian lion had finally retired by the beginning of the 20th century, was situated in the princely state of Junagadh before India became independent. Without any doubt the continued survival of lions is due to the

protection given to them by the Nawabs of Junagadh. At the end of the 19th century, poaching and uncontrolled shooting had brought the lions to the verge of extinction and it was believed that not more than 20 existed.

The Nawab's government then placed a strict ban on shooting, which was enforced rigidly. At a much later date a limited quota of never more than three in a year were permitted to be shot at the discretion of the Nawab. The protection measures were wonderfully successful and the number of lions increased to a remarkable extent. A census held in 1936 gave a count of 287 animals. Censuses in subsequent years indicate that the Gir holds a population of not less than 175 and not more than 275 lions. The protection received by the lions has been continued even more rigorously since India became independent.

The lion was for a period of time the national animal of India and still continues to be a national animal from its presence on the nation's crest, the lions of Ashoka.

The **leopard** or **panther** *(Panthera pardus)* is probably the most successful model of a predator. The known distribution within recent times was enormous, covering the whole of Asia from Asia Minor to the Caucasus to Manchuria and Amurland and reaching south to the islands of Indonesia and almost the whole of Africa south of the Sahara. That it is still not uncommon over a substantial portion of this range is a testimonial to the survival capability of the leopard. In size it is much smaller than the other two big cats of the Indian subcontinent, the lion and the tiger, with which it coexists. It is thought to have evolved earlier than the lion and the tiger, and like them migrated into India from the north. Fossil remains have been recovered from central and southern Europe. It obviously entered India well before the tiger and before Sri Lanka separated from the mainland as it occurs there too.

The coat and color of the leopard are distinctive. The ground color is of varying shades of grayish or whitish buff, the underside of the body white, with a white patch on the otherwise black ear. The pattern of the coat consists of solid black spots on the head and upper neck, outer side of the limbs and belly. Elsewhere rosettes of varying size occur. In some areas, notably in the high-rainfall areas of the Western Ghats and eastern India, **black leopards** are not uncommon. Cubs of the normal and black or melanistic form may occur in the same litter.

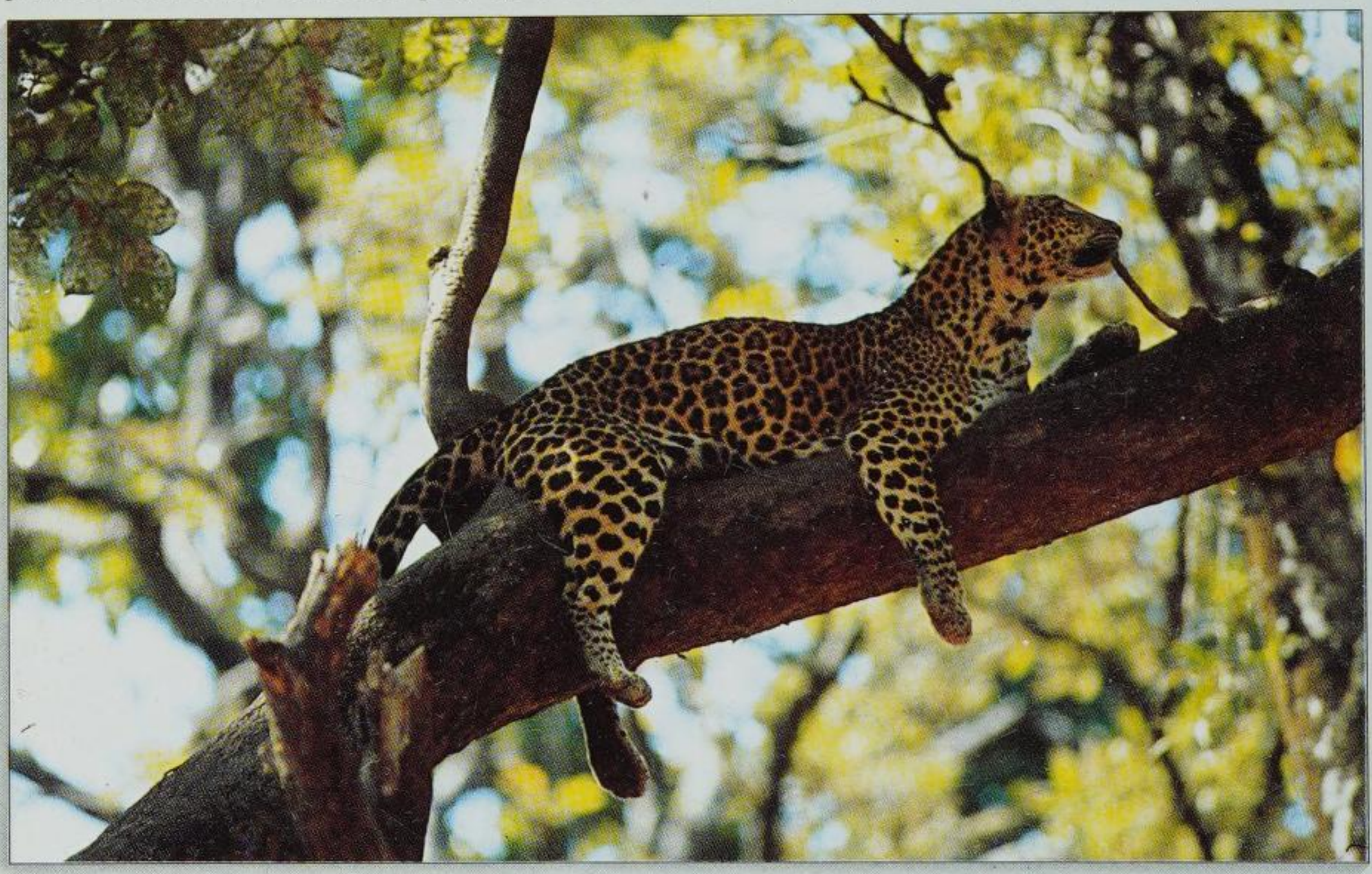
In size, leopards are considerably smaller than the lion and the tiger, the largest male hardly exceeding 7 ft 9 inches (2.36 m) in total length with a maximum weight of about 179 lbs (80 kg). The female is much smaller in length and weight, 1 foot (30 cm) less in total length and about 75 lbs (34 kg) less in weight. The wide distribution and the ability to adapt to different environments has resulted in several races of the leopard being described from different habitats. Among these are six races from the Indian subcontinent.

Although the habitats differ, the habits of the

Preceding pages, in Gir forest. Left, family at pool and above, on the prowl.

leopard throughout its range are more or less the same. The most successful and adaptive among the larger cats, the leopard lives in all types of habitats from open country with rocky outcrops to thick forests. The environs of villages and even the environs of large cities such as Mumbai (if it has a forest nearby) hold leopards. They have adapted to people's habits and, though they live on their domestic stock, remain invisible to the untrained and searching eye.

Catholic in diet, they eat anything they can kill from crabs to cattle and can be a pest in the neighborhood of villages and towns, living on domestic stock and being particularly fond of taking dogs. Monkeys are another favorite food and are often killed as they panic and seek safety on the ground. For its size, the leopard is quite powerful and often carries its prey up a tree to



store, probably to prevent other stronger predators from appropriating the kill. Apart from humans, the leopard's natural enemies are other carnivores such as the tiger, wild dog and hyena. There are instances of leopards being killed and eaten by python and the mugger crocodile. Leopards are a deadlier menace than the tiger when they become man-eaters, particularly from their greater boldness and knowledge of the habits of people.

The call of the leopard heard more often during the breeding season is distinctive, being three or four short bark-like roars very like the sound that a saw makes on wood. Leopards breed right through the year. The pairs stay together up to and after the cubs (two to four in number) are born. The gestation period is slightly over three months. The leopard is now a completely protected species in India, largely to protect it from the commercial exploitation of its skin by the fur trade.

The **snow leopard** (*Panthera unica*), the gray ghost of the snows, occurs along the length of the Himalaya from Kashmir to Arunachal Pradesh. An exclusively high-altitude leopard, it rarely descends below 7,000 ft (2,130 meters) in winter and in summer frequents the fringes of the snow line, the pasture area of its normal prey: the wild goats and sheep of the Himalaya. It has perhaps the most beautiful coat among the cats. It is gray above with a buff or cream tint, and has gray-centered black rosettes on the body and spots on the head. In winter the coat is dense and the tail bushy. It is smaller in size than the leopard of the plains, hardly exceeding 6 ft 8 inches (two meters) in total length. Very circumspect in its habits, the snow leopard is seldom seen though it does become troublesome to herders of domestic stock. The high position of the eyes on the head permits it to peep over a rock without exposing itself to its alert natural prey of bharal and ibex. Its habits are little known.

The breeding season is in spring and two to four cubs form a litter. The pelt of the snow leopard is in high demand and commercial exploitation has made the species endangered. It is on the fully protected schedule of the Indian Wildlife Protection Act.

The **clouded leopard** (*Neofelis nebulosa*) is a wide-ranging species being distributed from Nepal in the west to south China and south and east to

Borneo. However, it is still a rare and little-known species. A dark gray or ocherous-colored cat, it is marked with bold-black or dark-gray blotched patches giving a clouded pattern and hence the popular name clouded leopard. The face has the cheek stripes seen among many of the smaller cats. It is equal in size to a small leopard, measuring up to 6 ft 5 inches (2 meters) in total length and weighs up to 45 lbs (20.5 kg). A feature peculiar to the clouded leopard is the proportionately enormous development of the upper canines, which present the nearest approach among the living cats to the massive teeth of the extinct saber-toothed tiger. An inhabitant of dense forests, it is supposed to live on prey up to the size of the smaller deer. Nothing has been recorded of its breeding habits in the wild but it has been bred in captivity.

The **marbled cat** (*Felis marmorata*) is another widely distributed cat of eastern India, ranging in distribution from Nepal to Borneo. The marbled cat, as its name implies, has a marbled coat pattern made up of dark blotches more or less lined with black. The face has the usual cheek stripes. The general body color varies from gray to earthy or yellowish-brown of varying intensity; white or tawny below. It is slightly larger than a domestic cat being about 3 ft (1 meter) in total length, half of which is the tail. The marbled cat is a forest animal, at home in trees, and feeds on small mammals and birds. Very little is known of this elusive cat.

The **leopard cat** (*Felis bengalensis*) is more widely distributed than the three cats described above, occurring as it does throughout the whole of Southeast Asia, from Baluchistan in the west to Manchuria and Korea in the north to Borneo and the Philippines in the south. Curiously enough, it does not occur in Sri Lanka. The leopard cat looks like a miniature replica of its namesake; spots of black replacing the rosettes. The ground color varies from whitish, creamish-white buff, ocherous-buff to ashy gray. It is about the size of a domestic cat, being just under 2 ft (60 cm) in total length, more than half of which is the tail. A forest cat, it is not uncommon. It feeds largely on birds and small mammals, and in the vicinity of forest villages is an inveterate poultry-stealer. The young, three to four in a litter, are born in the first half of the year. Its beautiful coat is a coveted item for the fur trade and the species is now fully protected under the Wildlife Protection Act.

The **golden cat** (*Felis temmincki*) has a peculiar distribution, one species occurring in the west and central African forests, and another from the forests of Nepal to South China and south into Sumatra and Java. The color of the coat varies from dark brown to red to nearly gray with a distinct stripe pattern on the cheeks. About 4 ft (1.22 meters) in total length, including a comparatively short tail, it is next in size to the clouded leopard. It is a forest and hill-area cat of eastern India capable of killing animals up to the size of small deer. Not often spotted, little is known of its habits.

Left, leopards are good climbers and above, the rare leopard cat, Dachigam, Kashmir.

The **rusty-spotted cat** (*Felis rubiginosa*) is closely related to the leopard cat but is smaller in size and has no markings on the tail. The spots on the body are ferruginous and the ground-color is fawn-gray. This cat was thought to be peculiar to south peninsular India with a race in Sri Lanka. Recently is has been reported from Kashmir. It frequents fairly open country as well as forests. An excellent climber, it feeds on birds and small mammals and is known to take poultry. A litter consists of two or three kittens born in the hollow of a tree or in a cave or burrow among rocks.

The **fishing cat** (*Felis viverrina*) is a stocky, medium-sized cat with a tail shorter than its head and body length. The general body color varies from dark olivaceous-tawny with gray flanks to nearly ashy-gray. The stripes on the nape and head, and the spots on the body and base of the tail, and the bands on the tail, are black. Widely distributed in Southeast Asia, it prefers marshy habitats and its distribution is therefore patchy. In the Indian subcontinent it occurs in the Indus Delta, Keoladeo Ghana Sanctuary at Bharatpur, Rajasthan, coastal backwaters, estuaries and swamps of the southern maritime states and of West Bengal. It is very adept at fishing and is also powerful enough to kill sheep, calves, dogs and large snakes. The litter is usually of two kittens. The cat apparently does not have a fixed breeding season.

The **desert cat** (*Felis libyca ornata*) is believed to be one of the progenitors of domestic cats. Slightly larger in size than the domestic cat, the average size is about 20 inches (50 cm) in body length with a 10-inch (25-cm) tail, and it is about a foot (30 cm) in height at the shoulder. The general body color is yellowish with distinct black spots; the tail is banded with black distally. The desert cat is a race of African wild cat that is widely distributed in Africa, and southwestern and Central Asia to North India. In India it occurs in the deserts of Ladakh and Rajasthan and the drier areas of Kathiawar. It has been reported as far south as Puné.

Adapted to life in desert conditions, it is nocturnal and spends the day in burrows it has dug, emerging at dusk to hunt. It lives largely on rodents, but when necessary can subsist on insects and reptiles, etc. The gestation period is about one and a half months and a litter is of two to three kittens. The female alone cares and fends for the young.

Pallas's cat (*Felis manul*) is a small one, about the size of the domestic cat, and is peculiar to the arid high altitudes of Ladakh in India. Elsewhere it occurs in Pakistan and Central Asia. Its appearance is distinctive, the head being flat with widely spaced ears. The fur is dense and soft, with a grizzled or buff appearance and the tail, black-tipped and banded. The face is strikingly marked and the animal appears as if it is wearing a bandit's mask of black and white. Little is known of the habits of this high-altitude desert cat. It is said to live largely on the mouse-hare, rodents and ground-dwelling birds. Its call is said to resemble the yelping bark of a small dog.

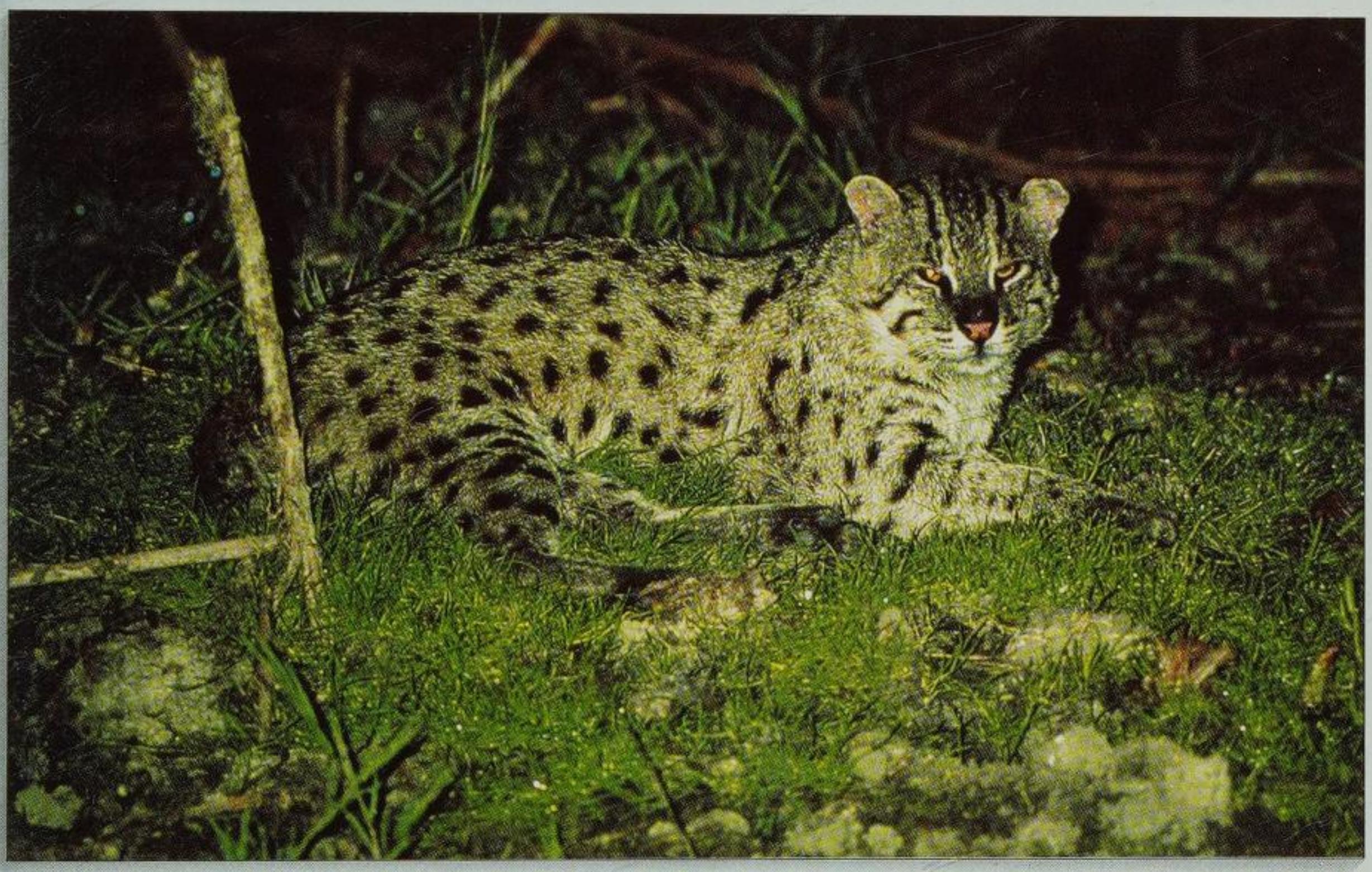
The **jungle cat** (*Felis chaus*) differs from the cats so far described in being longer in the leg, and with a short tail. It is widely distributed, ranging

from the Caucasus to the Middle East and Mediterranean, North Africa through Iran to the Indian subcontinent and Sri Lanka, and through Burma to Indo-China. There is a distinct spinal crest of hairs and a small pencil or tuft of hairs on the ears. The general body-color is gray to tawny to deep brown. Ear tips may be black. The two stripes on the foreleg are distinctive.

Three races have been described from India. In size they range up to 2.5 ft (75 cm) in body length with a tail half the length. The maximum weight recorded is 19.8 lbs (9 kg). It is most adaptable and occurs in habitats ranging from the vicinity of human dwellings to the densest forest. It often hunts during the day and is a swift and powerful predator, being exceedingly strong for its size. Though catholic in diet, it lives largely on small mammals and birds. It breeds during the early months of the year. Three to four kittens form a litter and the coats of these young ones are faintly spotted.

The **caracal** (*Felis caracal*) is a handsome, lithe, graceful, medium-sized cat occurring throughout Africa, except in forested areas, and from the Middle East to northern India. The color varies from pale sandy-fawn to reddish brown or dark gray. The pointed ears are black above, frosted with white, white on the inside, and with pencils or tufts of black and gray hairs. Its tail is short, about 9 inches (22 cm), its body length is about 29 inches (74 cm) and its shoulder-height is about 16–18 inches (40–45 cm). It weighs up to 40 lbs (18 kg). Incredibly agile, it is capable of knocking over several birds from a flock of pigeons that it has charged and is capable of killing animals up to the size of gazelles. The caracal breeds once a year but has no fixed breeding season. Litter sizes vary from two to six. Caracals when taken young are easily tamed and they used to be trained for hunting in the past.

The **lynx** (*Felix lynx*) is primarily a cat of the palaearctic zoogeographic region, the fringes of which extend into India in Kashmir and the Western Himalaya. The Himalayan race, *isabellina*, also occurs in Outer Mongolia, North China and the Russian Pamirs. Other races of the species occur in the tundra and boreal zones of Europe and North America. The lynx is a medium-sized cat with a very short tail and powerfully developed legs. The Himalayan race is pale isabelline in color, lacks a pattern of spots and, unlike in other races, the pads of its feet are not covered by hair in winter. The ears are pointed and tufted as in the caracal and the lower cheek has a fringe of long hairs. The body length is about 34 inches (85 cm) and it stands about 20 inches (50 cm) at the shoulder. It weighs about 35 lbs (16 kg). An uncommon animal, the Himalayan lynx is a resourceful hunter and feeds on a variety of prey ranging from young ibex to voles. It has an unusual habit for a cat: hiding or burying for future use portions of the prey it cannot eat at a sitting. The young are born in late spring or early summer, the gestation period being about two months. The litter size varies from two to four.



Left, jungle cats are found throughout India and above, the fishing cat is rarely seen.

THE ASIAN ELEPHANT

Zoologists put the **elephant** in the "order" *Proboscidea,* the natural group of animals with a proboscis or trunk as their distinguishing physical feature. Delving back into Earth's history, scientists have identified 352 members of this order that now survives in two genera, each represented by a single species, the African elephant *(Loxodonta africana)* and the Asian or Indian elephant *(Elephas maximus).*

While the African elephant has at least one recognized subspecies, there is no unanimity among specialists on the question of subspecies of Asian elephant. According to one taxonomic classification, the *forma typica* for the Asian animal is the Sri Lankan species; and there are three subspecies of the animal, one found in Sri Lanka, one on the Asian mainland extending to Burma and adjoining territories, and one in Sumatra. Some would find a fourth subspecies in West Malaysia. However, scientists working in the field in Sri Lanka did not find any significant morphological difference between the Sri Lankan and the mainland elephant.

To most people, particularly from the West, the elephant and India are inseparable. For an Indian, the elephant is a part of his/her history, tradition, myths and culture and, in many outlying areas, very much a part of the way of life. In northern Bihar and eastern Uttar Pradesh it is still the most coveted status symbol among the landed gentry; in South India there is no temple of any importance without its elephant; for some peoples in Arunachal Pradesh in northeast India, it is just another domesticated animal, which lives as a part of the household, serving its owner in many capacities, including that of a plow-animal.

It is difficult to say exactly when the art of capturing and training wild elephant was mastered in India. For at least three thousand years in India the elephant has been in the service of humans; yet, most of these animals have been taken from the wild, and subsequently tamed and trained to serve people.

They have seldom been bred for the purpose of developing a domestic strain. This is where the elephant is unique and different from all other domesticated varieties of animals and birds. A certain number of calves are born to domesticated cow animals living in forest conditions, usually but not exclusively sired by wild bulls; but their number is insignificant, at least in India, compared to the number culled from the wild. In fact, in India, animals taken from the wild are preferred to those born in captivity, as the former have a better temper and are more amenable to training.

Tusker, Yala National Park, Sri Lanka.

There is enough evidence to suggest that, historically, the elephant had a very wide distribution in India. During the Indus Valley civilization (3rd to 2nd millennium BC) when, as available evidence suggests, the western part of the subcontinent had not yet been desertified, elephants were probably ubiquitous all over the land, barring the higher reaches of the Himalaya and the coastal salt-water mangrove swamps. Even in the Himalaya, evidence of casual visits by elephants has been noticed at a height of 10,500 ft (3200 meters) in recent times.

Today, the Asian elephant is considered an endangered species. The distribution of wild elephant in India is limited to four widely separate geographical zones: South India (in Kerala, Karnataka and Tamil Nadu; recently a small group has found its way into Andhra Pradesh, much to the amazement and understandable consternation of the local people who had never seen a wild elephant before); Central India (in Orissa, Bihar and the adjoining southern part of West Bengal); North India (in the sub-Himalayan tracts of Uttar Pradesh); and northeast India (in Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Tripura and the northern part of West Bengal; a few come into Manipur from Burma seasonally).

Apart from India, Nepal and Sri Lanka, wild elephants are found in Bangladesh, Burma, China, Indonesia, Kampuchea, Laos, Malaysia (including Sabah), Thailand and Vietnam. In Nepal, the few elephants that survive keep to the sub-Himalayan belt of forests. In Sri Lanka they are confined mostly to the forests of the eastern and northern provinces.

This fragmentation of the once-compact geographical range of the elephant in the subcontinent (Pakistan has no elephants) is a direct result of drastic shrinkage of habitat. Elephants make large demands on their environment, an adult animal of average size consuming something like 450 lbs (200 kg) of green fodder a day, and probably wasting an equal amount in the process. A degraded habitat, therefore, cannot sustain elephant.

Indicators of ecological health: The elephant has few natural enemies. Calves are jealously guarded by their mothers and tigers seldom have the opportunity to take them. Even more rare, but not unknown, are instances of adult animals being attacked and killed by tiger. But these cases are noteworthy only because of their rarity. Lesser predators like the leopard, do not, of course, count in the context of the elephant. By and large, therefore, elephant is truly an apex species,

indicators of the health of their habitat, mostly tropical forests, but also some limited areas of subtropical forests.

A habitat that is good for the elephant is also good for its associate species, the sambar deer *(Cervus unicolor Kerr)*, the spotted deer *(Axis axis Erxleben)*, the barking deer *(Muntiacus muntjak Zimmermann)*, and so on, which in their turn keep predators like the tiger or the leopard happy. When the forest is good for these animals, the ecosystem is thriving, which means the water-regime is right, and so also is the condition of the soil; it is, therefore, also good for humans and the environment in general.

The elephant is a slow-growing species: the gestation period is between 19 to 21 months. Given the best living conditions, it has been estimated that the interval between two calvings is about four years. On the other hand, it is a long-living animal. The first calf is generally born to a female elephant around the age of 14 or 15 years. Instances of much younger cows calving are not unknown. And they can go on calving till the age of 60 or more. The longevity of the elephant in the wild is largely a matter of conjecture. The average life-expectancy of a healthy animal is assumed to be around 70 to 80 years.

The long reproductive period of the female of the species is a cushion against temporary set-backs suffered by a population due to natural calamities like extreme drought conditions (not a common happening in those Indian forests where the elephant now survives), or epidemic diseases like anthrax. This long life-expectancy combined with the fact that elephant are extremely adaptable in their preference of habitat – they thrive in all kinds of tropical forests except in dry scrubland and desert (which do not put off the African elephant), and salt-water mangrove – helps to explain why it has managed to survive despite a massive destruction of its habitat: the latest estimate of their number in the wild for the whole of India is 14,500, which shows some reduction on previous estimates. Sri Lanka has an estimated wild elephant population of 2,500, and Nepal of about 50.

The elephant's is a matriarchal society. The leader of a group is a female, usually the oldest, the largest, and the wisest of the lot. This is also called the family group, which consists of a nucleus of two or three mature cows, subadult animals still moving with their mothers, and calves.

The basic unit consists of a cow with its unweaned calf. The size of such a family group can vary from three to 10 or more in number.

Sometimes, in some particular season, especially when elephant are on the march, moving from one area of forest to another, several family groups come together to form what can be termed a "herd." They usually split up into smaller units once they settle down in any particular area for foraging. One such famous elephant herd in Manas Tiger Reserve in Assam numbers more than 140 animals. Subadult male animals, when they approach adulthood, are expelled from the group.

Periyar National Park in Kerala is one of the best places for viewing elephants.

This is taken to be nature's protection against inbreeding.

The nature of the relationship of mature old bulls of reproductive age to these family groups is a matter that has caused controversy. We now know a lot more about the social behavior of the African elephant than previously, thanks to the researches of Iain Douglas-Hamilton and others since the 1960s. We still lack such quantified research data for the Asian species. It seems, however, that the same group-behavior pattern prevails for both the African and the Asian species. As with the African animal, the adult male of the Asian species seems to lead a free, unattached existence, sometimes forming loose "bachelor parties" of their own, called *maljuria* in northeast India. An adult male goes into a herd when a cow comes into estrus, and leaves the group when the period of mating, which can last for a week to 15 days or more, is over.

Ivory, through the ages, has been a thing of irresistible attraction to humans. This has made the species peculiarly vulnerable in our era of breech-loading rifles. Fortunately, the female of the Asian species, unlike its African counterpart, does not carry ivory, and a good percentage of the male elephants in northeast India are tuskless (called *makna* locally) and hence do not attract ivory-poachers. This is not true of the forests of the south, where poachers have killed a considerable number of elephants for their ivory.

How big do they come? There is no currently accepted standard of judging the size of an elephant except by its height. The traditional method of measuring the height of an elephant, following the practice with horses, is at the withers. The average height of an African male elephant is around 10.5 ft (3.20 meters) at the withers, the very tall reaching 12 ft (3.65 meters) or even slightly more. An exceptionally large Asian male animal may be as tall as 10 ft (three meters). The average height of the adult Asian female elephant is eight to 8.5 ft (2.43–2.59 meters).

Elephants "Never Forget": How intelligent is the animal? Many tantalizing stories circulate about the alleged sagacity of the beast, and extravagant claims are sometimes made regarding its intelligence. Most experienced naturalists dismiss these claims. However, of all animals in the service of man, this is the only one that continues to be taken from the wild. Its ability to learn quickly is proverbial. A really well-trained animal can respond to about 40 command words. Using instruments is supposed to indicate intelligence. That elephants scratch themselves with sticks which help them to reach inaccessible areas of their body is well-known. Recently it was observed that elephants were breaking down electric fences with branches of trees, often collected from some distance away, seemingly specifically for the purpose.

The elephant's long memory is probably not just a tall yarn. There is an authentic account of a tusker running away to the forest, and then returning to its stall four years later, not having forgotten in the meanwhile a single one of the 40-odd command words it had been taught in its years of domestication.

Which is the most dangerous animal in the Indian forests? Barring such aberrant and unusual creatures as the man-eating tiger or leopard, undoubtedly it is the elephant. Docile zoo animals or circus animals performing tricks can give a very false impression of the animal in its natural state. Unquestionably, it is the King of the Forest, before whom all animals, including humans, must give way. Not surprisingly, Kipling made *Hathi* (elephant) the keeper of the law of the jungle at a time of exceptional stress, a terrible drought, and made Sher Khan the tiger slink away from its wrath after attempting some petty transgressions. There is nothing more magnificent (and more dangerous) in the forests of India, nothing that will give a greater thrill, than an encounter on foot with a lone 10-foot (3-meter) tusker in full *musth* (an elephant with its temporal glands secreting, when the Asian male elephant tends to become psychologically unbalanced and, sometimes, aggressive).

A good photograph of an elephant in the wild is worth the time and patience (and caution) it demands: the Asian elephant is largely a forest-dwelling animal and one has to be lucky to see it in the open in good photographic light. For viewing and photographing wild elephant, Sri Lanka has some splendid sites, particularly in Wilpattu (also famous for its leopard), Ruhuna, Yala, Gal Oya and Lahugala. In July–September in Lahugala, one can see as many as a hundred elephants or more grazing out in the open. In India, wild elephant can be seen in Manas (Assam), Dalma and Palamau (Bihar), Bandipur and Nagarahole (Karnataka), Periyar (Kerala), Mudumalai (Tamil Nadu) and Corbett (Uttar Pradesh).

One must not forget elephants in captivity, which is the way most of us know them. The annual dazzling show of elephants in the historic city of Kandy in Sri Lanka during the 10-day festival of Perahera in August deserves special mention. For 10 successive nights a procession of gorgeously caparisoned elephants parade the narrow streets of the ancient royal city, the chief place of which is the Maligawa, the temple that houses the sacred tooth of the Lord Buddha. During the concluding nights of the festival over a hundred elephants take part in the processions.

In India, the Dussehra procession in Mysore, which features elephants, and the temple elephants of South India in general and Kerala in particular, are noteworthy.

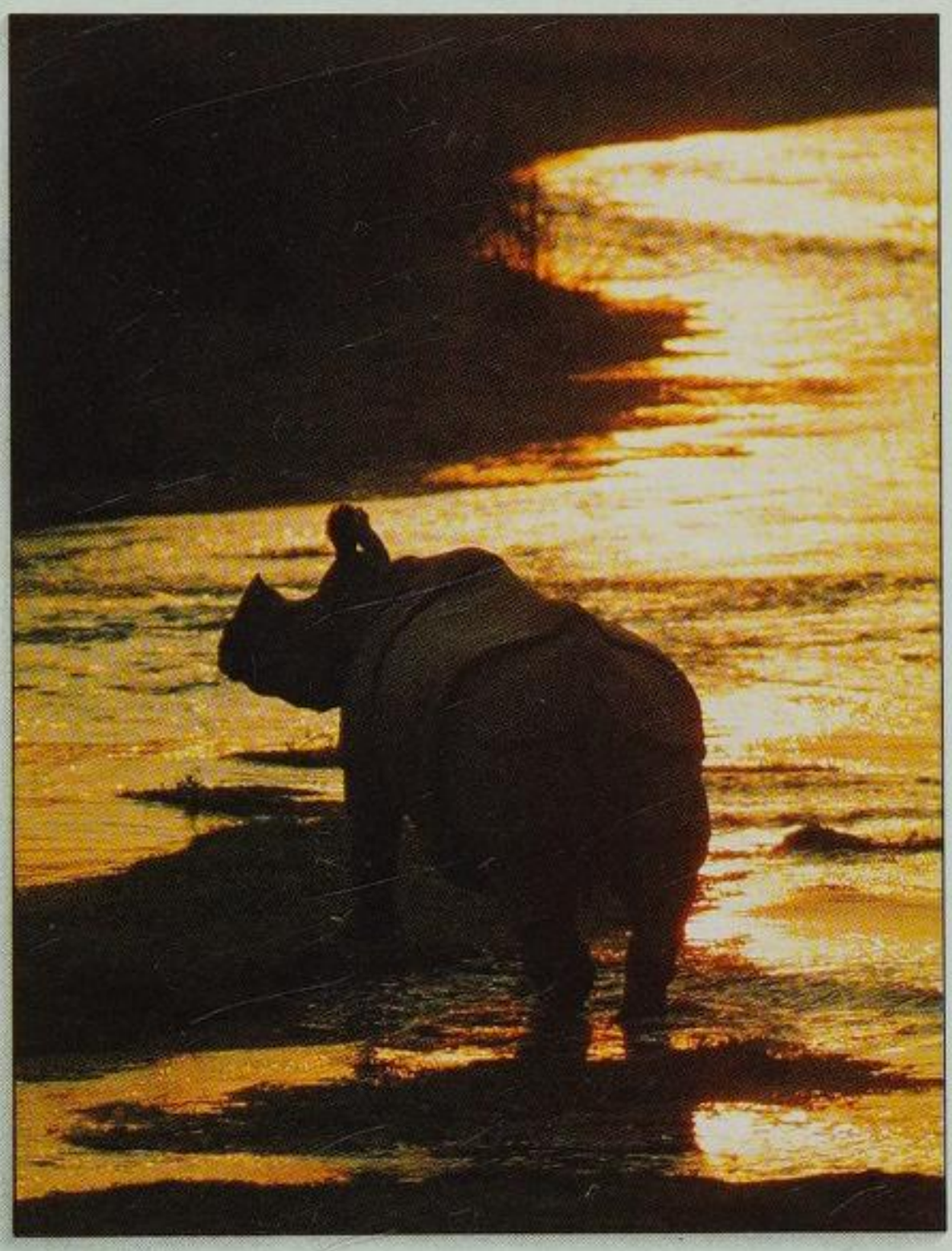
THE INDIAN RHINOCEROS

One misty morning in Chitwan National Park, southern Nepal, a magnificent male rhinoceros feeds nonchalantly in a lake. Occasionally, he submerges almost completely as he grazes on aquatic plants on the lake bottom. Suddenly, he pricks up his ears, perhaps on hearing the human intruder. He rushes out of the water grunting angrily, and disappears into the tall grass. Such a sight can now be seen in only a few other places on the Indian subcontinent, mainly in Kaziranga in the eastern Indian state of Assam. Small numbers of rhino still survive in some other areas. Only a few hundred years ago the Indian rhinoceros *(Rhinoceros unicornis)* ranged over all of the grassy floodplains of the Indus, Ganga and Brahmaputra rivers. The Mongol invader Timur, during his conquest of Delhi in 1398, and later, Babur, the founder of the Mughal empire in India in 1526, hunted rhino in northern India. But the rhino's habitat was also suitable for human settlement, and was gradually turned into farmland. By the beginning of the 20th century the Indian rhino was fast heading towards extinction. Because of excessive hunting for sport and poaching, by 1908 such prime rhino habitats as Kaziranga in Assam had only a dozen or so rhino left. It was only when hunting was stopped and immediate protection afforded to the area that the rhino showed signs of recovery. Kaziranga was declared a game sanctuary in 1926 and renamed a wildlife sanctuary in the late 1940s. In 1950 Chitwan in Nepal had the largest concentration of this animal anywhere, with 800 to 1,000. But, again, as a result of indiscriminate deforestation and poaching during the next 20 years their numbers fell to about 100 at the close of the 1960s.

Chitwan was declared a Rhinoceros Sanctuary in 1962 and gazetted a National Park in 1973, but the killing of the rhinos in the park stopped only in 1976, when a contingent of the Nepalese Army was entrusted with the task of combating poaching. The rhino has since staged a comeback, and there are now about 1,200 in Kaziranga and 400 in Chitwan, with about 100 in half a dozen other areas.

Appearance: With its deeply folded thick skin, studded with rivet-like tubercles on the shoulders, flanks and hindquarters, the Indian rhino appears armor-plated, which even sparked off myths that it was bullet-proof. Its massive build, its peculiar hide, its short stumpy legs, its huge head and the horn (actually a mass of densely matted hair) on the top of its snout, gives one the impression of a truly prehistoric beast. Which is not far from the truth as the rhinoceros has changed little in the last million years.

The Indian rhino averages about 5.5 ft (1.6 meters) at the shoulder and weighs 4,000 lbs (1,820 kg). Gray in color, although they look jet black when wet, their skin may also appear whitish, or the color of the wallow, once the mud dries on their skin. Adult males may be differentiated from the females by their larger



Left and right, the Indian rhinoceros is now confined to a few parks in Assam, West Bengal, Bihar and Nepal.

size, their more pronounced skin folds on the neck, their genitals being visible from behind, and by horns that are usually thicker at the base and often broken or split at the tip (the horn of the female is usually slender and unbroken). The horn averages 8 inches (20 cm) in length, although it may be longer. Adult females may also be recognized by the presence of their accompanying calves.

To a casual observer, all rhinos look alike, but to a naturalist, a nick in the ear, a scar on the flank, a notch in the fold or a split in the horn is a definite mark of each beast.

Other rhinos: There are five species of rhinos: two in Africa and three in Asia. African rhinos, both the **black** *(Diceros bicornis)* and the

white *(Ceratotherium simum)* have two long horns, set one behind the other. The **Sumatran rhino** *(Didermocerus sumatrensis)* has two smaller horns, often thick stubs. The **Javan rhino** *(Rhinoceros sondaicus)*, like the Indian species, has a single horn, usually less than 6 inches (15 cm) long. Both the Sumatran and Javan rhinos roamed eastern India until the end of the 19th century, but have since disappeared.

Habitat: Floodplain grassland interspersed with marsh, swamp and lake, and the adjoining riverine forest, are the favored habitat of the Indian rhino. They prefer to feed on short grasses and seek shelter in thick stands of tall grass, sometimes 20–25 ft (6–8) high.

Although largely grazers, Indian rhinos will also browse leaves from shrubs and trees and, when near farms, will supplement their diet with crops, which they habitually raid at night. They are fond of water and will spend hours wallowing. Besides cooling their huge bodies, the swamps and lakes also provide them with nourishing food in the form of aquatic plants.

Behavior: Rhinos occasionally feed and wallow in scattered groups of up to 10 or so, but they are solitary by nature and normally confine their movements to a small area of 0.3–2 sq miles (0.75–5 sq. km). This, therefore, is their home range, which meets most of their requirements of food, water, and shelter. Males may have to wander further for mates. When two rhinos meet, ritualized behavior, a series of displays and postures involving the curling of lips and baring of sharp tushes, accompanied by snarls and grunts, usually decides who is dominant and violence is avoided. But at times only physical battle will settle the dispute. These fights are noisy and sometimes lengthy affairs, and can lead to serious injury; in rare instances, losers are mortally wounded. The horn is not the rhino's chief instrument of attack; their razor sharp tushes are, which can cut an opponent's hide without difficulty. Male rhinos become sexually mature at about 10 years old, females a few years earlier. During courtship, violent encounters between the male and the female usually ensue and after much noisy chasing of the female by the male, mating finally takes place. Mating takes up to an hour or more, the female sometimes dragging the male about, while still mounted.

After a gestation period of 16 to 16.5 months, a calf (exceptionally two) is born. At birth they are pink and weigh about 130 lbs (60 kg). The mother and the calf will stay together for 3 to 4 years. Meanwhile, the mother will probably have mated again and be ready to produce another young. Rhinos live for up to 50 years.

Rhinos usually avoid humans, but anyone straying too close to one, cornering one, or threatening a mother with calf, should be wary. It will usually warn an intruder with an angry snort, but sometimes it will charge, occasionally without any provocation. Human casualties

The rhinoceros calf is dependent on its mother for protection against the tiger.

from rhino attack are not uncommon. Most charges are displays of threat, stopping short of the target, but a rhino will, on occasion, press home its attack.

Signs: Rhinos leave distinct three-toed spoor on the ground, squarish in shape and not quite as large as those of the elephant. From constant use a large network of rhino trails is formed in the grassland, often forming "tunnels" through the thick grass. They also have favorite rubbing posts: a low overhanging branch, a sloping tree trunk or a stump. From regular rubbing, a distinct smooth patch is left, often coated in mud.

In rhino country, large piles of dung, known as middens, are common. These are accumulations from months, even years of use. The dung pile probably serves to inform other rhinos about an individual using a particular area. In the past poachers used to take advantage of this habit of the rhino to hunt them. They would either dig and conceal a pit on the approach path to the dung pile, or they would lie in wait for them in a nearby tree and kill them with a muzzle-loader gun.

Myth, medicine, masculinity: Rhinos have long been regarded as magical beasts surrounded by strange myths, and early Europeans have confused them with the fabled unicorn. In fact, for hundreds of years, until the late 18th century, rhino horn was imported into Europe as unicorn horn and used as a potent drug. In medieval Asia cups were carved out of rhino horn — often with exquisite designs on them – in the belief that the liquid in such a cup would froth, or that the cup itself would split in two, if the liquid contained a poison, thus warning and saving the life of the intending drinker.

The medicinal value of Rhino horn is believed to have medicinal value in East Asia, notably as a fever-depressant. The Chinese do not use rhino horn as an aphrodisiac, although some Indians do. In Nepal it has no medicinal significance but a bowl made of rhino horn (or hide) is used to offer libations during the Hindu memorial ceremony of *shraddha.* And were it not for the incredible value placed upon this protuberance, the rhino's future would perhaps have been more secure.

Indian rhino horn fetches high prices, and 1 pound (0.45 kg) of it will be worth at least US$9,000 in Bangkok or Mandalay, although the primary poachers get only a small percentage of its eventual price. However, they still make more than if they were to toil on the land for one to 3 years. Because of poverty, lack of education and unemployment, the poacher finds it worthwhile to take risks, although the penalties are imprisonment and a fine.

In India and Nepal, every part of a rhino is used: skin, horn, hooves, flesh, bone, penis, the internal organs and even blood, urine and dung. They are believed to cure diseases, ward off evil spirits, reduce labor pains, bring good luck, ensure good harvest, improve health and above all, one's sex life. No part of a rhino is wasted. When a dead rhino is found, its horn (if there), hooves and skin are taken into government custody and the local people rush to buy parts of the carcass. To those who do not understand the concerns of conservationists, a rhino is more useful dead than alive. Apart from satisfying their medicinal and ritual needs when dead, live rhinos are a menace to their farms and a threat to their lives and livelihoods.

The future: In terms of increasing rhino numbers, Kaziranga and Chitwan may be viewed as a success. But this has also increased the conflict between rhino and man. Rhinos, like elephants, have no natural predator other than man – although calves are sometimes eaten by tigers – and with continued protection their numbers are likely to exceed the natural carrying capacity of the parks. This will have to be carefully monitored by the park managements.

Biologically speaking, the more rhinos the better, but socio-economically, it is counterproductive to antagonize farmers as their support is vital for the long-term future of the rhino and other wildlife. Already crop damage by rhinos is considerable, and it is chronic in some areas. In Chitwan a rhino fence (consisting of a deep pit) in the Sauraha area met with limited success. Fencing off national parks and reserves sounds good theoretically but has practical limitations. Putting up heavy-duty fences on the floodplains will not only be very expensive but will also involve constant repairs. Political disturbances in Assam slackened park vigilance in Kaziranga for some years and over a hundred rhinos were poached in the first half of the 1980s. In Chitwan, however, because of stringent protection, rhino poaching in the park is almost nonexistent.

Although the future of the Indian rhino now seems secure, it is still a matter of anxiety that this rare and endangered creature should be confined to a few habitats. In order to spread the populations and provide new habitats for the endangered animals, a few rhinos from Assam were released in Dudhwa National Park in Uttar Pradesh in 1984 and a few more were brought in from Chitwan a year later.

In early 1986 a few rhinos from Chitwan were released in Bardia, in far west Nepal. These translocation projects are an insurance against the possibility of random extinctions. These introductions do seem to have been successful, but conservationists are still anxious abou the rhinos long-term future.

DEERS, ANTELOPES AND BOVINES

Africa is universally accepted as the world's greatest haven for wildlife. Few are aware that, of the six greatest cats in the world belonging to the genus *Panthera*, India has five species to the African continent's two; and has eight species of deer and three species of wild ox to Africa's one each. In fact no country in the world, not even Russia, possesses the number of distinct species of cervids that India has.

The largest and the most widely spread of the Indian deer, the **sambar** *(Cervus unicolor)*, has the widest distribution of all deer in the world, extending from Saurashtra to Taiwan and the Philippines, and from the Himalaya to Laos and Borneo, Sumatra and Sri Lanka. Yet nowhere does the species reach the same proportions in body and antlers as it does in India. The largest antlers, including the record specimen of 50 inches (127 cm), come from the Vindhya and Satpura ranges of Central India. A large stag may stand 59 inches (150 cm) at the shoulder and weight 660 lbs (300 kg).

Essentially not gregarious in behavior and mainly nocturnal and wary in the major portion of its area of distribution, the sambar has become common, confiding and diurnal in parks and sanctuaries where it has been adequately protected, and Sariska and Ranthambhore National Parks in Rajasthan are among the best places in the world to see and photograph them by daylight. The Betla Tiger Reserve in Bihar, the Melghat and Taroba National Parks in Maharashtra, Bandhavgarh and Satpura National Parks in Madhya Pradesh, Nagarahole National Park in Karnataka and Periyar National Park in Kerala are other excellent places to see sambar. They also occur in the Gir forest, in Corbett and Dudhwa, Manas and Kaziranga and in fact in most forested parts of India, except the mangrove, and extend up to 9,800 ft (3,000 meters) in the Himalaya.

The larger stags are usually solitary, except during the rutting season, which extends from November to January. The antlers are shed from March to May and the animal molts, often assuming a very ragged pelage. New antlers begin to grow soon after shedding, but during this period the stags are secretive and rarely seen. The most often seen sambar group is one or more hinds with their progeny of different years.

They are a preferred prey species of the tiger and are widely preyed upon by the wild dog *(Cuon alpinus)*. However, the greatest threat to their survival, apart from the common factor of habitat destruction, is their susceptibility to bovine diseases, contagion contracted from India's ubiquitous livestock. The sambar population of Sariska was severely ravaged some years ago by an epidemic disease.

Hangul or the Kashmir stag is found only in a few areas of Kashmir.

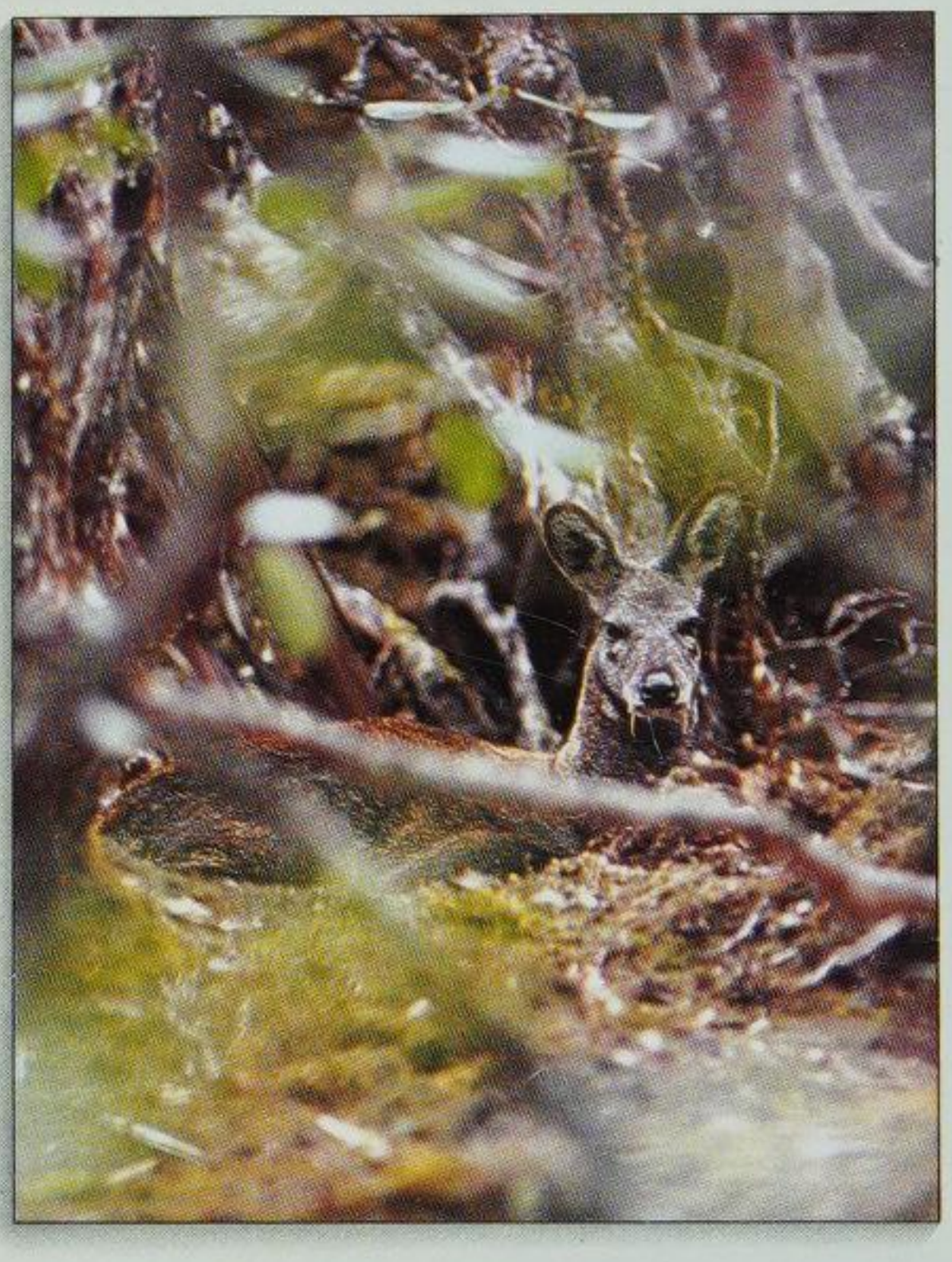
Survival for the Sangai? At the other extreme of the scale – in rarity as well as in the restricted area of occurrence – is the **Manipur brow-antlered deer** *(Cervus eldi eldi)*, the most endangered wild animal in Asia. The smallest in both body and antler development of the three subspecies of this deer (the other two being the Burmese thamin and the Thailand subspecies), the Manipur deer, locally called the **sangai**, was from historical times confined to the vale of Manipur. Adapted to the grassland-forest mosaics, the most productive ecological entities of Asia, the sangai were driven to extinction by man in their preferred habitats. Until World War II, however, they were still not uncommon in the swamps where the survivors had sought refuge. They had adapted to their semi-aquatic existence by developing elongated hooves and hard and hairless posterns, which assisted them in their movements in the morass and floating islands, and which are a distinguishing feature of this subspecies.

The intrusion of the Japanese army into Manipur in the war – their westernmost advance – followed by Indian independence, augured unsettled times for the sangai and an end of the princely patronage that had previously protected it. Being in close proximity to human settlements, the sangai were doomed, and by 1951 they were believed to be extinct. However, E.P. Gee, a pioneer of the conservation movement in India, located a small, surviving population of the deer in a remote swamp at the southern end of the Logtak lake. A unique ecosystem, consisting of a contiguous floating mass of dead and living grass, the 11-sq-mile (28-sq-km) area of the Keibul Lamjao was estimated by Gee to hold about 100 sangai.

The nature of the swamp, where the floating morass supported the weight of the deer with their long hooves and specially adapted gait of small hops (earning them the nickname of dancing deer from Gee) – but on which humans sink to their waiss every few steps, made a true ground survey of their numbers almost impossible. In 1972, a gross estimate, based on a sample survey, placed the sangai population at 50. It was only when, for the first time, a helicopter survey was carried out in 1975 that the grim position became evident. There were only 14 Manipur brow-antlered deer left in the wild – 5 stags, 6 hinds and 3 fawns. In 1978, 23 animals were counted; in 1984 the tally had increased to 51. But still there are far more

sangai in captivity than there are in the wild and searches have not revealed any area really suited to their rehabilitation in a second home in the wild. Thus, the survival of the wild sangai is as yet irrevocably linked with the fate of the miniscule Keibul Zamjoo National Park. Almost the only chance that a visitor has of seeing this most graceful deer in its natural environs is to quietly punt a dugout canoe with a pole over a specially cleared water channel to the Pabot Hill, a feature within the park, and from the elevation of this lookout point observe the animal.

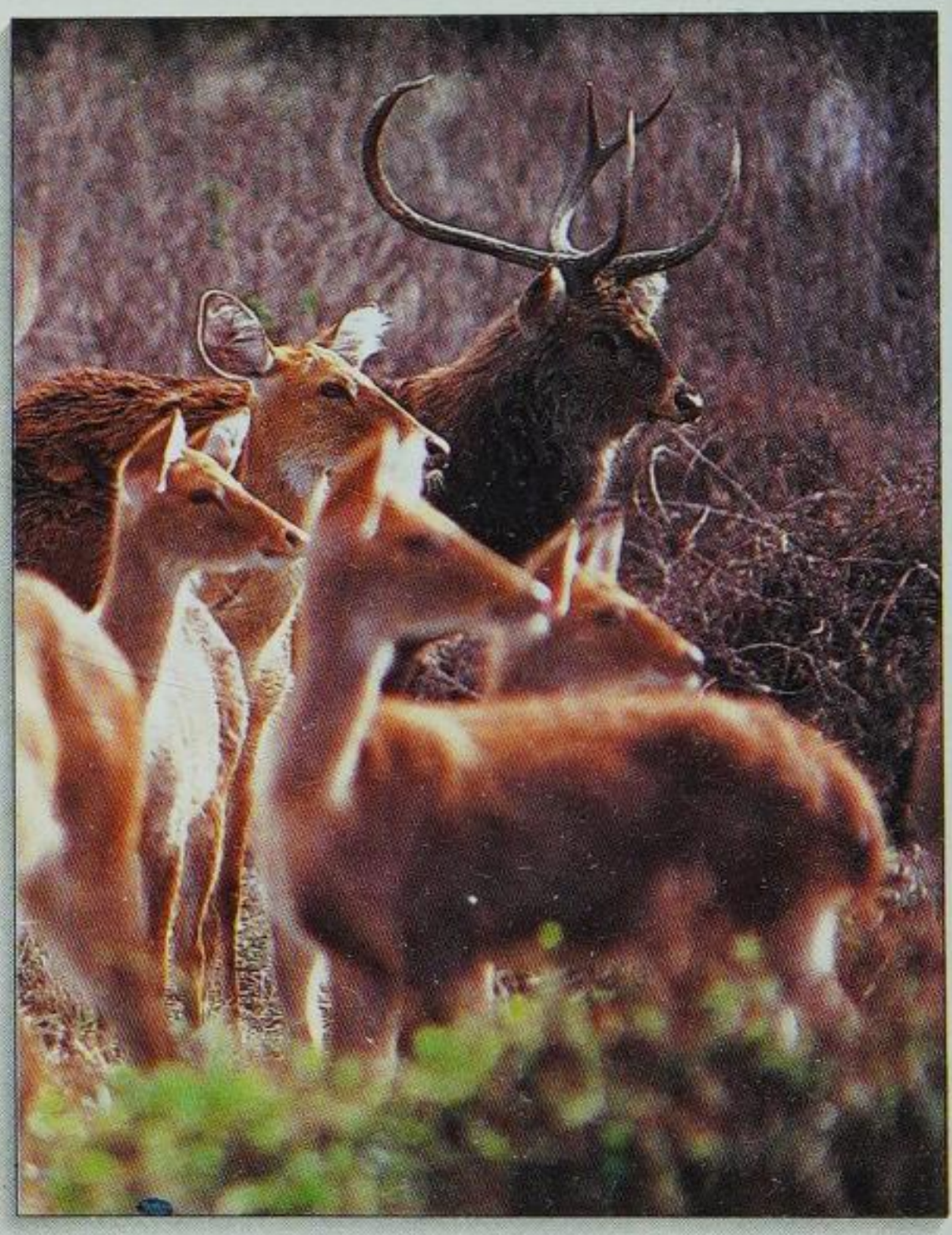
Standing a little over 3 ft (1 meter) at the shoulder and weighing about 200 lbs (100 kg), the stag sangai is much larger than the hind. They are a very handsome deer, turning dark chocolate-brown in the rutting season from their ocher-fawn pelage during the molt. Their most notable physical



feature is the unique formation of their antlers, which form a continuous arc from the highly developed brow-tines to the main beam of the antler, without the angular junction over the pedicle characteristic of all other deer antler formations. Hence the name brow-antlered deer.

Costly specialization: The **barasingha** *(Cervus duvauceli)* is another deer that has paid the price of its specialized adaptation to alluvial and riparian grasslands so coveted for agriculture by humans. Gregarious, and living in favorable habitats, the barasingha in the past attained great density of population in the Ganga-Brahmaputra and Central Indian grasslands. No deer species in India has suffered such a drastic decline of habitat as the barasingha. It survives today only in fragmented herds, frequently wide apart and often small. There was a period in the 1960s when there was despair about the future of this elegant deer, especially the southern race in Central India. Effective protection, especially the creation of parks and sanctuaries in its remaining habitats, has yielded good results and the decline of the barasingha has not only been halted, but in many places it has made a good recovery.

Divided into three subspecies – *C.d. duvauceli*, the nominate race occurring today mainly in Dudhwa National Park, Kanchanpur Sanctuary and the Pilibhit forests of U.P., with a relict population close to Hastinapur near Meerut and a sizable herd in Kanchanpur Division in Nepal; the eastern race *C.d. ranjitsinhi*, now confined to Assam and there almost only to Manas and Kaziranga; and the southern or Central Indian



race, *C.d. branderi* in Kanha and Indravati National Parks in Madhya Pradesh – their total world population is between four to five thousand. In Kanha, their numbers have increased from 66 in 1968 to approximately 500 animals and this park is the best place to both view and photograph them. Dudhwa and Kaziranga are two other excellent areas to watch this deer.

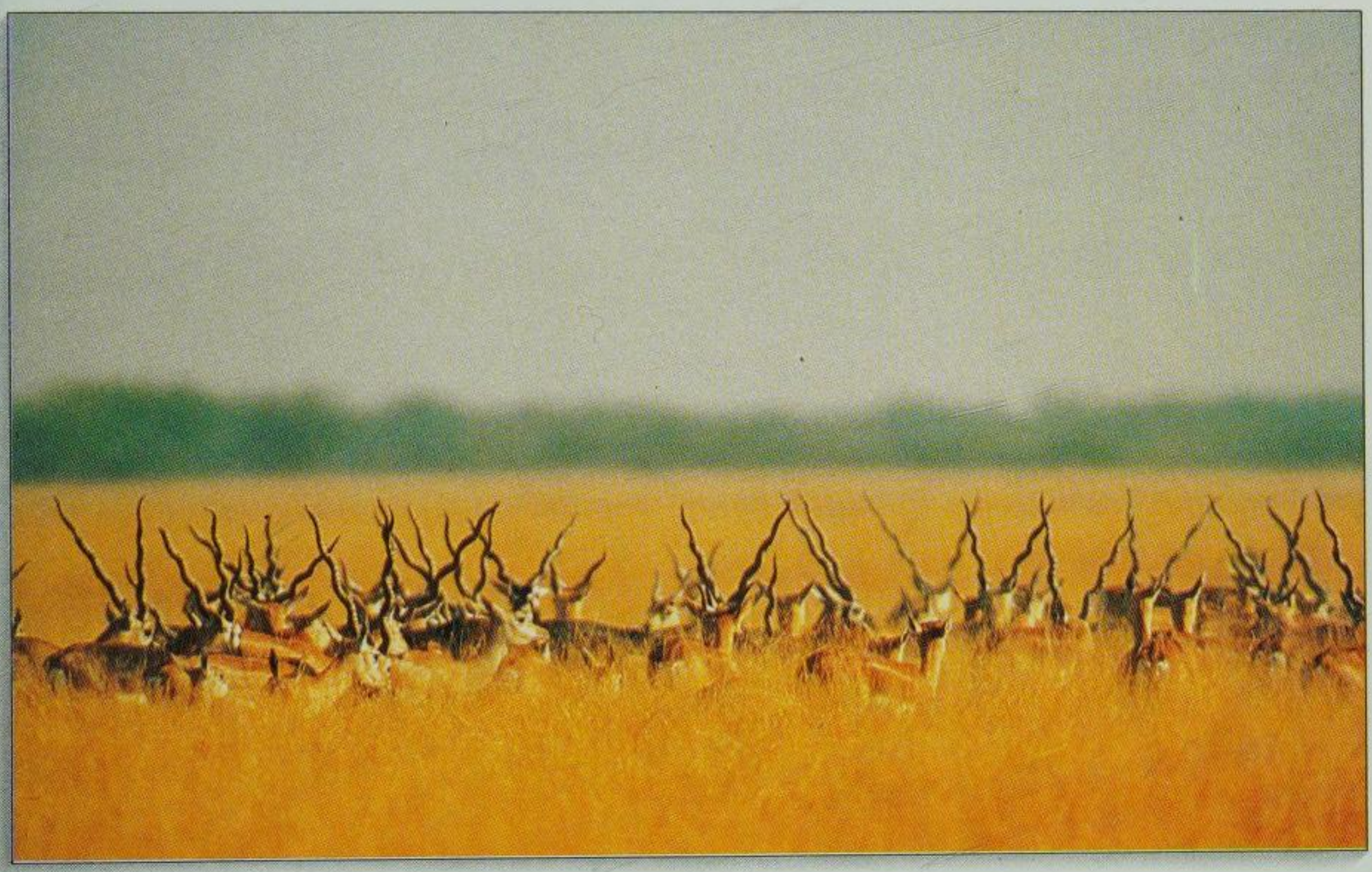
In Assam and Uttar Pradesh the barasingha continues to remain almost exclusively partial to its grassland habitat, remaining in the open meadows even in the noonday summer sun. In Central India they move into the sal forests, especially in early autumn. They are almost exclusively grass grazers, another manifestation of their grassland adaptation, but fortunately they are not prone to

crop-raiding, which has been the downfall of many herbivores. They frequently wade into water to eat the sedge-grasses, sometimes immersing even their heads.

With the approach of winter the barasingha emerge from their khaki-saffron coat to their rutting pelage of dark brown. The stags, standing about 50 inches (127 cm) at the shoulder and weighing approximately 400 lbs (180 kg), lose the velvet from their antlers, develop a swollen neck and a ruff, characteristic of many deer species in the same situation. The antlers, 12 or more – pointed in an adult (hence the name, *bara* = twelve; *singha* = horns) – are usually more polished and hence lighter colored in the northern and eastern races than in the southern ones. Grass is thrashed and a deliberate attempt is made to carry grass tussocks on the antler rack to give it more impressive proportions. Wallowing in mud and "bugling" are other manifestations of the rut, the call being a hoarse braying not dissimilar to that of a donkey. The stags are not territorial and the male hierarchy and dominance of the master stag is achieved more by display than actual combat.

Spotted beauty: The **chital** or **spotted deer** *(Axis axis)* is amongst the most widely distributed and common of the larger wild mammals of the Indian subcontinent. Indeed, it is also one of the most ornamental, and unlike many other spectacular ungulates both sexes sport an exquisite pelage throughout the year.

Its watchful and alert behavior, seeking safety in numbers, coupled with a high rate of reproduction and ecologic adaptability, has enabled it to attain its current safe status. In the Andaman Islands, where it was introduced around the beginning of the 20th century, it had assumed pest proportions. It is found from the Gir forest in the west to Manas in the east, and from the Himalayan foothills to Point Calimere Sanctuary in the south. Chital, of all the south-Asian deer, also has the greatest tolerance to human proximity. In many national parks and sanctuaries they seek the safety of human habitations at night – often moving amongst the tourist huts – as a precaution against predator attack.



Being both a browser and a grazer, chital prefer grassland-forest borders. In the vast grassland *chaurs* of Corbett and *maidans* of Kanha national parks, both favored habitats, they congregate in great number. In early July when the chital rut is at its peak, about 4,000 chital have been seen milling around in an area of barely 4 sq miles (10 sq km). Their numbers in Kanha increased from about 8,500 in 1973 to 14,500 in 1985. Bandipur in Karnataka, Taroba in Maharashtra, Palamau in Bihar, Barnawapara in Madhya Pradesh, Chila in Uttar Pradesh, and Sariska and Ranthambhore in Rajasthan are other protected areas notable for their chital concentrations.

A daily drink or two is essential for chital and they are never found too far away from water. But

Left, musk deer is sought for its scent glands; a group of brow-antlered deer (the world's rarest) of Manipur. Above, a magnificent display of blackbuck, Velavadar, Gujarat.

of the larger species of Indian deer, chital is the one that does not wallow when in rut. The rutting period of the chital is also less defined and there are always some stags in hard antlers throughout the year, a factor contributing to its prolific propensity. The rutting stags thrash saplings, strut and emit harsh, bellowing calls.

The chital has a symbiotic relationship with the common langur *(Presbytus entellus)*, congregating beneath the feeding monkeys for pickings falling to the ground. Primates have been seen riding the back of a chital. The chital and the langur are the most frequent and first notifiers of the presence of predators, the shrill, musical whistle-calls of the deer often interspersed with the harsh, staccato barks of langur marking the march of the tiger.

Though preyed upon by both the tiger and the leopard, in many parts of its habitat it is the wild dog that is the chital's main predator.

Closely related to chital is the **para** or **hog-deer** *(Axis porcinus)*, a squat, rotund deer adapted once again to riverine grasslands. The stags carry a three-point antler formation, like those of the chital and the sambar, but with the inner, top tine curved characteristically downwards.

The rutting of the hog-deer occurs in autumn, earlier than that of most other deer of the plains, and consequently the antlers are also shed earlier in early spring, the deer then assuming a lighter-colored coat on which the spots are visible more distinctly. When disturbed, a hog-deer dashes off with a characteristic lumbering lope, head slung low and stretched out, the long tail raised to reveal the white underside as a danger-flag.

Once found from the grassbeds of the Indus in Sind to Assam, and beyond to Indo-China in the east, it was later restricted to the Indo-Gangetic Brahmaputra valleys in the Indian subcontinent. Today in India it occurs sporadically in the Jumna and Ganga highgrass *khadars*, along the *terai* and *dooar* grasslands from Uttar Pradesh to Arunachal Pradesh, in suitable high grasslands and lowland grassland-forests on both banks of the Brahmaputra, and in Manipur.

High floods take a heavy toll of the hog-deer in Kaziranga. But the numbers recover fast and this park is the best place to see and photograph the animal in India; Corbett being the other. Dudhwa in Uttar Pradesh, Jaldapara in West Bengal, and Manas and Orang in Assam are other protected areas where hog-deer are prominent.

Shy tush-bearers: An earlier evolving member of the Cervidae family, the **barking deer** (*Muntiacus muntjac*) represents the transition phase of the deer family, from oversized canines or tushes as weapons of offense and defense, to antlers that serve the same purpose. While the musk deer and some other species elsewhere have tushes, the barking deer carries both tushes and a unique pair of antlers. These grow from a pair of elongated skin-covered pedicles, which themselves appear as an extension of two elevated ribs or ridges that so prominently mark the forehead of the deer. The antlers have a short brow-tine, but the main beam is then not bifurcated in its journey upwards and then inwards. But it is the tushes that are the weapons actually used.

Solitary, shy and secretive, restricted in their movements and often confined to small home ranges, barking deer are seen in ones and twos, often for mere fleeting glimpses. The best and frequently the only method of photographing them is to watch over a water hole or salt lick. Their alarm call is barely distinguishable from the barking of a village dog; their mode of escape not dissimilar to that of the hog-deer.

Found in heavy forested regions from the Himalayan pines and firs to the southern tip of the Western Ghats near Kanyakumari and from the Satpura Hills in Western Central India to Arunachal Pradesh and Nagaland and beyond, barking deer can be seen in most of the protected areas in this vast region. Yet none can be called an ideal place to view them. In Nagarahole and Bandipur in Karnataka, Nagjhira and Melghat in Maharashtra, Satpura and Bandhavgarh in Madhya Pradesh, Rajaji and Dudhwa in Uttar Pradesh, Manas in Assam, and Simlipal in Orissa, to name a few, the chances are better than in other places.

Closely related to the hornless, tush-bearing deer is the **chevrotain** or **mouse deer** *(Tragulus meminna)*. A diminutive, speckled-gray creature, barely a foot (30 cm) high, whose male members have small dagger-like tushes, the mouse deer is not a true deer, having only three compartments to its stomach and belonging to the family *Tragulidae*. Its present range extends from the heavily forested regions of the Western Ghats, through eastern Madhya Pradesh, to the sal forest belt of southern Bihar and Orissa. Even smaller, more solitary, evasive and cryptic than the barking deer, the mouse deer is rarely seen except with the aid of a powerful light at night.

Elegant antelope: Africa is the continent for antelopes, with a multitude of species from the magnificent greater kudu to the tiny dik dik. But with the exception of the sable, there is no antelope that can really match the male **blackbuck** *(Antilope cervicapra)* for its color-combination and elegance, the matching proportions of its horn shape and length to its body size. There are few animals that one can truthfully describe as exquisite. The male blackbuck in his chocolate-black rutting pelage, strutting stiff-legged, with face upraised and horns swept back, is one such. It is also an animal truly representative of India, having evolved in this subcontinent and having become extinct in the wild except in India and on the India-Nepal border. It is one of the swiftest animals in the world and a herd traveling at 50 miles (80 km) per hour for a distance of over a kilometer has been clocked.

Dominant herd males are intolerant of the presence of other mature males and male blackbuck maintain territories, often very small and in close juxtaposition to each other. Aggression is mostly confined to strutting displays, but sparring, jousting and chasing are not infrequent. There is, however, rarely any serious injury, evolution having provided in the convoluted horn-shape of the bucks, as it has provided in the branching antler-

Left, the mouse deer, the region's smallest and above, nilgai or blue bull, Asia's largest antelope, Ranthambhore, Rajasthan

tines of stags, a locking mechanism that prevents an animal from making a fatal thrust. The preorbital glands exude a strong-smelling musky secretion that is rubbed on grass stems or tree holes if they are available. Horns are thrashed on vegetation and if none is available, as is sometimes the case in blackbuck country, on the bare ground.

Pure white blackbuck are not uncommon, though this occasional lack of pigmentation appears to be more common in Saurashtra.

Blackbuck were perhaps the commonest wild animal in India prior to independence. Being in close proximity to human habitations, living in open, easily approachable habitats and raiding croplands as they did, no animal in the subcontinent has suffered such a steep decline in numbers, and reduction in areas of occurrence, as has the blackbuck. There were hardly any parks or sanctuaries that held blackbuck populations prior to the 1970s. They survived in isolated pockets, particularly in Rajasthan and Gujarat, almost entirely due to the religious sentiments of the local people, notably the Bishnois and the Valas. According to one estimate there were once some 4 million blackbuck on the subcontinent. Today, the estimated number is around 25,000. The foremost places to view the blackbuck are the Velavadar National Park in Gujarat with a population of about 2,000; Talchapar, Gajner, Doli, and other Bishnoi areas in Rajasthan; Bagdara, Noradehi and Kanha in Madhya Pradesh, the last having a small herd in a unique habitat; Vetnoi in Orissa; Point Calimere in Tamil Nadu and Rane Bennur in Karnataka.

Frisky gazelles: Even more independent of water and moisture content in food plants than the blackbuck, the **chinkara gazelle** *(Gazella gazella)* has a wider range of distribution than the antelope in arid lands. They are also at home in rolling hills and scrub forest, and being less prone to raid crops and living less in agricultural areas in the proximity of man, the rout suffered by the gazelle, though drastic, has not been as complete as that of the blackbuck. The decline of the chinkara and the blackbuck in the past two centuries has been a major contributory factor in the decline and final extinction of the cheetah *(Acinonyx jubatus venaticus)* in the subcontinent.

Less gregarious than the blackbuck (groups of over a dozen are rare), chinkara tend to keep within definite home ranges. They are in a constant state of animation, black tail wagging, ears twitching, heads frisking one way and the other. Chinkara are presently found in good concentrations in the Desert National Park and the Bishnoi areas of Rajasthan, and Kunu Sanctuary and Panna National Park in Madhya Pradesh.

Blue "Cow": The **nilgai** *(Boselaphus tragocamelus)*, the largest of all Asiatic antelopes, has been fortunate. Firstly, it possesses an insignificant pair of horns, which is no real trophy for the hunter. But what is more important, its somewhat physical resemblance to cattle has earned it the name *blue cow* and the religious sanction that goes with it. Despite its serious crop depredation propensities it has been left unmolested in areas of Hindu predominance, and Muslims have been hired on occasions to get rid of

them. Its flesh is still taboo to the Hindus.

Occurring in small groups from Jammu and the Punjab to Karnataka and Saurashtra to Bihar, the nilgai prefers open forests and scrubland, though where persecuted they have moved into heavier cover. Living mainly in areas where the tiger is absent, and the leopard rarely being able to tackle them, man has been their main predator in the present and recent past.

Sariska and Ranthambhore in Rajasthan, Panna and Shivpuri National Parks in Madhya Pradesh, Paneli in Gujarat, and the more open-forested protected areas of Maharashtra and Andhra Pradesh are the best places to view the nilgai.

Unique antelope: The only wild animal in the world to possess four horns, the **four-horned antelope** (*Tetraceros quadricornis*) is the smallest antelope in Asia, being about 2 ft (60 cm) high and weighing about 35 lbs (16 kg).

Exclusive again to the Indian subcontinent, the animal possesses a pair of short anterior horns with a pair of sharp-pointed longer posterior horns that can be used as rapiers.

Preferring patches of grassland amidst forests and open forests with a grassy understory, the **chausingha,** as the four-horned antelope is commonly called, is home-range oriented, living singly or in pairs. Its range extends from the *terai* forests and Jammu to Mudumalai Sanctuary in Tamil Nadu, though in the past it was reported even in the Palni Hills. It occurs in the Barda and Gir forests of Gujarat, extending eastwards to Bihar. It is another very difficult animal to photograph in the wild.

It is interesting to note that the only other known ruminant to have possessed four horns, the Sivathericum, whose fossils are found in the Siwalik hills, also occurred in India and was the largest known ruminant.

Wild oxen: The tallest, sleekest and, colorwise, one of the most striking of the 11 species of the subfamily *Bovinse* or wild oxen that survive in the world today, the **gaur** *(Bos gaurus)* is also, next to the wild **yak** *(Bos grunniens)*, the best adapted to hilly terrain. It is also currently the least endangered of the Asiatic wild bovines

Preferring dense forests away from human habitations and livestock, quite content to confine itself to its beloved bamboo thickets and even to steep slopes, and not raiding agricultural crops even if they are close at hand, the gaur has avoided, as it were, the pitfalls suffered by the wild buffalo, which in the historical past had a far greater distribution and numbers.

Extending from the Agasthyamalai hills at the southern tip of the Western Ghats to Satara and Kolhapur in Maharashtra and up to the central segments of the Narmada river in Madhya Pradesh, the gaur distribution sweeps eastwards and northwards past the Amarkantak massif, where the Narmada and Sone have their sources, into the Chota Nagpur tracts of Bihar, Orissa and West Bengal, and then on to

Left, gaur, largest of the world's wild oxen in Nagarahole, Karnataka. Above, only small pockets of pure wild buffalo survive in Assam, Madhya Pradesh and southeast Nepal.

the northeastern regions of the subcontinent.

The animal attains its most impressive proportions in the moist, semi-deciduous and evergreen forests of southern India. The glistening black bulls, bulging muscles rippling under the skin, heavy-horned and with a pronounced dewlap and hump on the withers, white stockinged feet in contrast to the dark pelage of the body, are some of the finest sights of the parks and sanctuaries of the South – Nagarahole, Bandipur and Bhadra in Karnataka, Mudumalai and Annamalai in Tamil Nadu, Parambikulam and Periyar in Kerala. Mollem in Goa, Tarboa in Maharashtra, Pench, Kanha, Achanakmar off Satpura in Madhya Pradesh, Belta in Bihar and Simlipal in Orissa are some of the other places where the gaur can be readily seen.

The older bulls are frequently found alone or in twos. Male dominance is mainly achieved by lateral displays in slow, measured steps wherein the masculine attributes of the bulls, the dorsal ridge, the dewlap and foreshoulders, are displayed to best advantage. There is rarely any actual combat. Also called the Indian Bison, (which is a misnomer as the only two true bisons that survive today are the European and American), the gaur is very susceptible to bovine diseases. Rinderpest and anthrax have decimated their herds in the past in Bandipur, Mudumalai, Periyar and Kanha, in the first two more than once. They have yet to recover their previous numerical strength in these areas. Until they attain an age of about 2 years, gaur calves are preyed upon by the tiger, and it is this that prevents the small herd of gaur in Bandhavgarh from increasing in numbers.

Fearless buffalo: Were it not for the similar appearance of the ubiquitous domestic buffalo, the **Asiatic wild buffalo** *(Bubalus bubalis)* would surely have ranked as one of the most impressive and magnificently built animals in the world today. It is the most powerful and heaviest but yet most proportionate of all the South Asian wild bovines, and in the record specimens it carries the largest horns of any surviving animal in the world today. The females carry even longer though more slender horns than the bulls. A large buffalo bull can scale nearly 2,000 lbs (over 900 kg).

Seals of the Harappan Culture (2,500 BC) depicting the wild buffalo testify to its then existence in the river basin. In the more recent historical past, the range of the animal extended over the riverine and forest grasslands in the Ganga, Brahmaputra, Narmada and Godavari river systems. Today it is found mainly in the surviving Brahmaputra valley grasslands – Kaziranga, Dibru, and Manas.

A small herd survives in Kosi Tappu in Nepal. The peninsular Indian wild buffalo population, perhaps the purest genetically, survives in small scattered populations in Udyanti in Raipur district, Bhairamgarh, Indravati and Pamed in Bastar district of Madhya Pradesh, and perhaps a small herd in the Koraput district of Orissa. The total population in the subcontinent is in all probability less than 2,000.

Its preference for alluvial grasslands most coveted by man for agriculture is the main reason for the wild buffalo's loss of habitat. Its fearless, even truculent behavior has also not helped. But what has perhaps been a most vital factor, both direct and insidious, contributing to the numerical and physical decline of the wild buffalo, is the propensity of the bulls to commandeer domestic buffalo cows for mating. The deprived owners of the livestock take pot-shots at the offending bull if one is around, as it can cause the loss of access to milk and often the loss of the impregnated domestic buffalo cow who cannot safely deliver the oversize calf.

Not infrequently, the wild bull prevents the return home of the domestics, which not only means the permanent loss of the livestock to the owner but also the creation of feral buffalo populations that are not of the same proportions and grandeur as their wild sires. This genetic "swamping" is very evident amongst the wild buffalo populations that come in contact with the domestic animals, as in Kaziranga and southern Manas.

Though calves are occasionally killed by tigers, the willingness of the wild buffalo to stand its ground and drive off and even attack a tiger, helps in keeping away all but the largest and most determined tigers. They form a phalanx and face their adversary, the youngsters in between.

The threat display involves a direct frontal approach, the muzzle slightly depressed to show the vast sweep of their massive horns to their best advantage. Snorting and foot-stamping are other manifestations. Horned combats, resulting in injury to one or both participants, though uncommon are not unknown.

The major part of the day is spent in grazing or resting, with a midday dip, an almost unvarying routine, especially in the hot season. The necessity of water in adequate quantity is, therefore, a restrictive factor in the wild buffalo's movements and habitat selections.

In an economy-conscious world where even a living being has to have a price-tag attached to it to be of "value" to a decision-maker, the wild buffalo is genetically one of the most important wild animals in the world today owing to its close affinity with the most important domestic animal in Southern Asia. Yet man has allowed the wild buffalo to become one of the most threatened animals in India, and to be almost wiped out elsewhere.

Nilgai in Sariska, Rajasthan.

PRIMATES

Classified in the same Natural Order as human, non-human primates have always excited people's interest. Hindus in the region will hardly ever assault monkeys as they are held to be sacred, and their protection is further strengthened by the Hindu legend that the monkey god Hanuman, with his monkey army, helped the divine prince Rama recapture his bride Sita.

Primates include apes, monkeys, lemurs and tree shrews. They evolved from arboreal ancestors, developing the prehensile hands and feet distinctive to them.

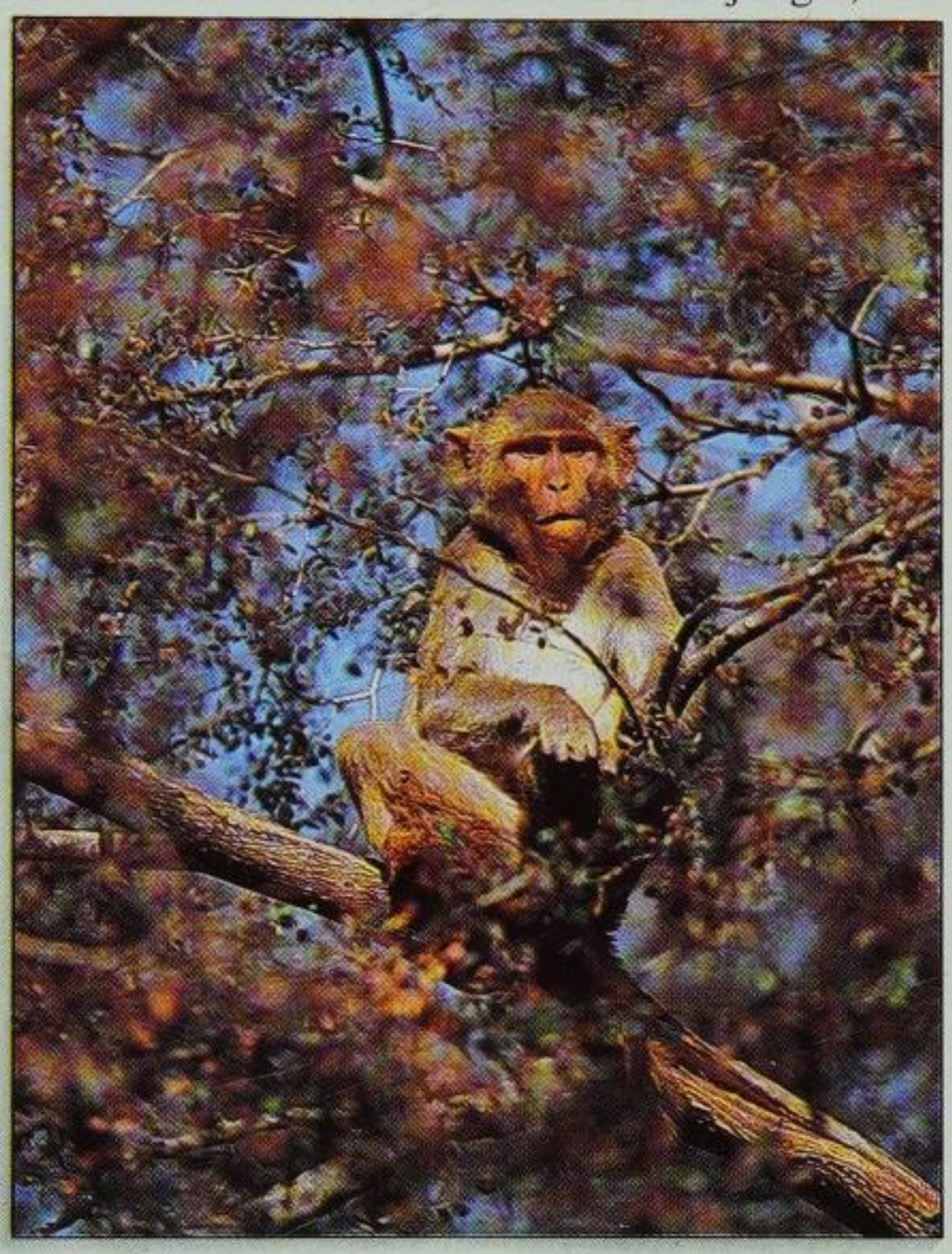
There are two suborders of primates: the earlier evolving *Prosimii* and the later *Simiae*. *Prosimii* include tree shrews and lorises whose brains are not as highly developed as those of the *Simiae*. More widespread than the *Prosimii*, the *Simiae* include the many types of monkeys and one species of lesser apes found in the Indian subcontinent. They are mainly diurnal and arboreal, though some species spend a considerable amount of time on the ground.

Most primates are essentially vegetarian. Some are exclusively so, while others add animal food, such as insects, crabs, mollusks, birds, birds' eggs and even mammals, to their vegetable diet. A macaque, which can be distinguished from a langur by its sturdy, squat and solid build, has cheek pouches to store food that cannot be consumed immediately. The langur, by contrast, is tall, slim and stately, and has a special pouch in its stomach that serves the same purpose. Apes, tree shrews and lemurs eat whenever food is available.

While most *Simiae* primates are social animals living in troops of up to a hundred individuals and found throughout almost the whole subcontinent, thriving in tropical conditions, tree shrews and lorises are found only south of the Ganga and in eastern India. Of the 21 species of primates found in the subcontinent, including Sri Lanka and the Andaman and Nicobar Islands in the Bay of Bengal, there are three types of tree shrew and two species of loris. The former, previously classified as insectivores, are the smallest of all primates and though in appearance tree shrews resemble squirrels, they display little squirrel-like behavior.

Shrews: The **Madras tree shrew** *(Anathanaellioti)* is a small, rat-sized, squirrel-like animal that has prehensile hands and feet. Reddish-brown to gray-brown in color, it has a bushy tail and a pale oblique shoulder stripe. Well-distributed south of the Ganga, it lives on trees in tropical rainforests and in thorny jungles. It is diurnal and catches insects on the ground, but it also feeds on fruit and often takes to the trees as a means of escape. It is easily tamed and is commonly kept as a pet in southern India.

In the northeast, the **common tree shrew** *(Tupaia glis)* extends its range across Sikkim, Assam and Manipur. Similar to the Madras tree shrew, it has short ears and a bushy tail. Its dorsal parts and tail are brown to reddish-brown, speckled or grizzled. The ventral parts are buff to brown, and there is a pale stripe just in front of the shoulders. Two subspecies are found in India, one in thick rainforest and mountain jungle, the other in bamboo bushes and trees near human dwellings.



Though expert climbers, common tree shrews do not leap from tree to tree as squirrels do, nor do they jerk their tails or cling head-downwards on tree trunks. Instead, they spend a considerable amount of time nosing for food among fallen leaves and in rock crevices. They eat fruit and also small mammals and birds. Found in pairs, they are more sociable than their peninsular cousins, and as many as five tree shrews have been observed together. Of the third species, the **Nicobar tree shrew** *(Tupaia nicobarica)*, very little is know. It has a long tail, and its ventral parts are a pale brown, the dorsal part is brownish-black while the head and limbs are brown. Two different subspe-

Left, the rare lion-tailed macaque found in the South Indian hills. Right, the rhesus macaque, common throughout North India.

cies are found, in the Great and the Little Nicobar Islands.

Lorises: Two subspecies of Loris are the only primate species in this part of the world that are nocturnal. The **slendor loris** *(Loris tardigradus)* is found in Sri Lanka and southern India, while the **slow loris** *(Nycticebus coucang)* prefers the densest parts of tropical rainforests in eastern India.

The slender loris is a small, thin and lanky creature with long slender limbs. Its body is well-furred, with a dark-gray, reddish-brown back. It has a white muzzle and huge, round eyes enclosed in a black or dark-brown circle. Though it has the same secretive and nocturnal habits as the slow loris, it is not confined to dense jungles and is found both in tropical rainforest and in more open woodland and swampy coastal forest. Usually found alone or in pairs, it sleeps through the day in shady, inaccessible places – in the hollow of a tree or at the leafy extremity of a branch, rolled up in a tight ball, with its head between its legs and grasping its perch with its arms.

The slow loris also sleeps through the day, rolled up in a ball, but during hot weather it stretches out on a branch. Its diet includes shoots, fruit, insects, reptiles and birds – in fact anything it can lay its "hands" on. True to its name, the slow loris is very deliberate in its movements. When hunting insects it never springs, but catches them with a sudden lunge, never letting go of the branch on which it maintains a tenacious grip. Unlike the solitary slender loris, the slow loris is found in small family groups. In appearance it is less lanky, with a brown streak on its crown and dark markings on its pale brown face.

Macaques: Few people, if any, would need an introduction to either the macaque or the langur. While some of the species are commonly seen around temples, bazaars, villages and even railway stations, others live in isolated pockets in some of the most inaccessible areas.

Of the three types of monkeys found in the region, the macaques are the largest family, being represented by eight species. Northeast India is the home of some of the rarest macaque species, such as the **stump-tailed macaque** *(Macaca arctoides)*, which is found in the hilly forests of Assam, Arunachal Pradesh and Nagaland. Its fur is dark chestnut and shaggy. Its forehead is bald with only crown hairs radiating from the center, short in front, longer at the back and on the sides. Its face is pinkish; its buttocks and genitalia reddish. As among all other macaques, the sexes are alike, though the male is sometimes heavier and bigger.

The stump-tailed macaque is fairly terrestrial but does spend a lot of time in trees as well. Just before daybreak, troops of up to 30 individuals head for their feeding grounds, and if there are any *ficus* trees with ripe fruit, they will almost certainly be found there. They rarely stray far from their feeding trees. During the afternoons, they rest or groom themselves, before feeding again and returning to their resting trees. Though extremely noisy while feeding, they have been known to raid village fields in absolute silence. They are relatively unafraid of humans. In fact, Naga Adivasis are said to be afraid of them, for they can

be terribly pugnacious when it comes to giving up a field they are feeding on. They use their hands to carry food to their month, and after filling their cheek pouches, again use the flat of the hand to press their cheeks to bring food back into the mouth.

The **pig-tailed macaque** *(Macaca nemestrina)* inhabits the same forests as its stump-tailed relative, but it is more arboreal and keeps strictly to dense evergreen forests. It is one of the largest of the genus, with long legs and an elongated muzzle. Its face is bare, light brown, and its crown hairs are short, radiating from a central whorl and forming a thick cover of erect hairs. The body color varies; the dorsal parts are grayish-olive to russet (with a buff to yellow tinge in places) while the forehead and crown are darker; the ventral parts are mostly grayish while the lower abdomen

is slightly reddish. The face and hindquarters are pinkish-brown and the tail is short, dark reddish-brown on top and carried half-erect like a pig's tail.

The pig-tailed macaque is one of the few monkey species found in the subcontinent that faces a threat from human poachers. Its meat is sought after by certain Naga groups and it is also in great demand in Southeast Asia for "coconut picking" – the monkey is sent up the tall palms to pick the fruit. Shy of people, it abandons the trees and tries to flee from any threat by running on the ground. Because of its wariness, attempts to obtain reliable estimates of its declining population have been unsuccessful.

Left, blackfaced langur and above, the golden langur confined to a small pocket on the Assam-Bhutan border.

The **Assamese macaque** *(Macaca assamensis)* gets its name from Assam, but its habitat is not confined to the northeast. Its range starts from as far west as Mussoorie in Uttar Pradesh and moves eastwards to the hill ranges of Assam and the forests of the Sunderbans in the Ganga delta. It is relatively large, with a pendulous well-haired tail, which is anywhere from a third to a half of the head and body length. The face is pale and flesh-colored with four or five deep diagonal wrinkles. The body fur is felted, and the crown hair is brushed back. The Assamese macaque, like the pig-tailed variety, is also hunted for its meat, but to a lesser extent.

Large troops of this macaque are not uncommon, often seeking strength in numbers, and sometimes large troops gang up to raid crops. They are particularly abundant in the valleys around Darjeeling and a troop can sometimes consist of over a hundred individuals, moving around in the forests like a ghost army. They prefer hilly areas and dense jungles, and by and large prefer to keep their distance from humans; and like most macaques, they display an amazing indifference to humans unless molested.

The **long-tailed macaque** *(Macaca fascicularis)* is really a Burmese monkey, and but for its existence in the Nicobar Islands, it can hardly be described as an Indian animal. Very little is known about the Nicobar subspecies.

The ubiquitous rhesus: Perhaps the best known macaque in India is the **rhesus macaque** *(Macaca mulatta)*, which lives in a variety of habitats, including cities, villages, farms, forests and mountains. It inhabits the semi-desert forests of Rajasthan, the swamps and mangroves of the Sunderbans, and extends across to Burma in the east.

It is at home in trees or on the ground, and equally at ease sitting on a temple roof or a tin shed in a railway depot. Devoid of fear of humans, it often grabs food from unwary pilgrims. The origin of its commensalism is not clear and it is also not known if commensal groups differ from wild populations morphologically.

The rhesus has the usual squat, thickset build of a macaque. The hairs on its crown radiate backwards from the forehead without the neat center parting that marks its relative, the macaque of southern India. Its body is olive-brown, with orange-red fur on its loins and rump that distinguishes it from all other Indian monkeys. Almost throughout its range, the rhesus is free from human molestation, but its capture for scientific research has affected its status.

Rhesus macaques live in highly organized troops, the largest of which are found in the plains where over a hundred individuals coexist under

the leadership of a dominant male. In very large troops, smaller subgroups are formed, each under a male, and a clear-cut social order exists within the troop.

The relationship between adult males ranges from peaceful and even cooperative to highly antagonistic, while females are quite tolerant of each other. Grooming forms a major part of their daily activities, but it is the relationships of juveniles that is most fascinating. Little play-groups of three to four young individuals display a natural exuberance rarely seen in other animals.

Southern cousins: Almost as if a line had been drawn across the subcontinent by some unseen hand, the rhesus macaque of northern India is replaced by another pale-faced monkey commonly seen with itinerant entertainers in southern India.

an instance where a dominant male once broke a canine, he kept his mouth shut as long as he could, but once the secret was out, the other males set upon him and considerably reduced his status.

Further south, in Sri Lanka, the **toque macaque** *(Macaca sinica)* replaces the bonnet macaque. Among the smallest of regional macaques, it has a gray face that is reddish in the case of mature females. The dorsal parts are gray to ocher, brown or red, while the limbs are a lot paler, the ventral parts being almost whitish. The crown hairs form a central whorl or a cap; and the tail, longer than the head and body, has a black tinge.

Though there are three subspecies recognized, all are confined to Sri Lanka, and its range overlaps that of the Hanuman langur. Sometimes the two intermix, but it is always the toque macaques that dominate and they spend time grooming the

The **bonnet macaque** *(Macaca radiata)* is similar to its cousin, the rhesus, except for the reddish rump and long dark hairs that radiate in all directions from a whorl on its crown. Found near villages and in jungles, it is particularly fond of *ficus* trees, and where there are two or more banyan trees and water, the chances of finding a troop of 20 to 30 animals are quite high.

Found more or less throughout southern India, troops of bonnet macaques living in the jungles are quite shy, but those that are quartered near human settlements lose all fear of people. The troops are controlled by a central core of highly dominant males who collaborate when necessary. In a highly defined social setup, the fluctuations of a male's status depends on various factors. In

larger black-faced Hanuman langurs.

The toque macaque is found in jungles in low, dry areas, and in wet zones from high elevations to lower hills and the seashore. A troop consists of up to two dozen animals, and it is most active during the day, feeding and moving along the tree-tops. The toque, when frightened, will shelter behind foliage and it is preyed on by leopards, pythons and even crocodiles.

In the south, there is yet another macaque: the **lion-tailed macaque** *(Macaca silenus)*, which can be distinguished from other macaques by its long, gray or brownish mane around its face and its striking black body. It has a tail almost two-thirds the length of its head and body, with a small tuft at the end that is very pronounced in the case

of adult males and from which the macaque gets its common name.

It is perhaps the most arboreal of all macaques, normally remaining at the top of the forest canopy. Because of its shy nature, black color, and its habit of living in dense, dimly lit, lonely forests, it is rarely seen. Found in the dense forests of peninsular India, it is most commonly found in the Western Ghats, the Nilgiri, Anaimalai and Cardamom Hills and also in the vicinity of Periyar Lake in Kerala.

Until recently, the lion-tailed macaque was considered to be highly endangered, but the discovery of a large population in the rainforests of Karnataka has tripled the estimate of its numbers. Information on this macaque is still relatively sparse, but it is known to share its habitat with three other primates. While the bonnet macaque avoids a confrontation, there have been reports of ferocious battles being fought with the only other black colored primate – the Nilgiri langur *(see below)* – with both sides suffering severe casualties. The lion-tailed macaque are very deliberate in their movements, and when crossing from tree to tree, they avoid jumping, but descend to the ground and walk across in single file. A troop usually consists of 10 to 20 individuals, and the females usually outnumber the males.

Langurs: Every morning, at dawn, the rainforests of Periyar Tiger Reserve echo to the deep booming of the **Nilgiri langur** *(Presbytis johnii)*, which is among the five langur species recorded in India and Sri Lanka. It has a glossy black body and the back of its head is yellowish-brown with a brown crown. Females differ from males slightly in that they have a white patch on the insides of their thighs. It generally inhabits the *sholas* (woods of the plateau – strips of forest surrounded by grassland, usually with a stream running through) of the Western Ghats south of Coorg, and the Nilgiri, Anaimalai, Brahmagiri and Palni Hills. Though essentially arboreal in the Nilgiri, it can often be seen crossing the grassland, from one *shola* to another. Destruction of its habitat has threatened the very existence of the Nilgiri langur. Troops are sometimes quite large, with as many as 30 animals. They travel over a well-worn route, each individual stepping in exactly the same spot as the leader. Though shy of humans, they sometimes raid plantations but, by and large, they are fairly elusive.

Left, gray-capped langur, Sri Lanka and above, the capped-langur, forest dwellers in northeastern India.

In Sri Lanka, the **purple-faced langur** *(Presbytis senex)* takes the place of the Nilgiri langur, both of whom share a common geographic distribution with the Hanuman langur. Brownish-black in color, with a lighter crown and nape, its whiskers are almost white, and they sweep backwards to cover the ears. The throat and chin are white and the tip of the tail is a pale brown.

There are four subspecies, all of which are found in Sri Lanka, and its habitat includes wet forests, as well as parkland and dense montane cloud forests invaded by grassland. It is both arboreal and ground-dwelling, and on broken

ground it can be seen walking around on boulders.

A forest-dwelling animal, it is fearless when not molested by humans, and it is exclusively vegetarian, feeding on new leaves, flowers and fruit. There is no marked dominance hierarchy, with any animal of either sex taking on the role of leader, but the male usually tries to herd his females, and may exercise a peace-keeping function. Troops are small, not exceeding 10 to 15 animals, and sometimes one finds an all-male group.

The range of the **Hanuman langur** *(Presbytis entellus)* stretches north and then east to encompass almost the entire subcontinent. Represented by 16 subspecies, it can be found above the snow line in Kashmir, in Sri Lanka in the south, Rajasthan in the west and right across to Burma in the east. It is a large, black-faced, gray-bodied langur with long limbs and a tail that is longer than its head and body. Indifferent to man if left alone, it will retreat quickly if threatened, but, on the other hand, Hanuman langurs living near temples are know to mob pilgrims, panicking them into parting with their food.

In the wild the Hanuman langur's keen eyesight makes it an effective part of an "early warning system" against the tiger and the leopard, both of which it hates without reservation. Consequently, it has developed an effective relationship with deer, and chital can often be seen feeding under a tree inhabited by langurs.

Both species react to each other's alarm calls, and nine times out of 10, langur and chital alarm calls lead to a tiger or leopard sighting. The langur live in large troops and their diet includes some of the (for many creatures) most poisonous leaves, which are avoided even by insects. They can also be seen sitting on the ground, eating mud from which they get their required salt intake. They are territorial, but rarely does a group fight to defend its ground.

In 1907, reports of a cream-colored langur came in from the east bank of the Sankosh river, near the India-Bhutan border, but it was only in 1953 that the tea planter-naturalist, E.P. Gee, came forward with any real evidence of the **golden langur** *(Presbytis geei)* as it was subsequently named. It has a cream back that looks golden in good light, darker sides and a black face with no sign of any hair. It has a long tail with a tassel at the end. In winter the langur looks a lot more golden than it does in summer when its coat looks

almost white or creamish.

The golden langur is a highly arboreal species, descending to the ground only during the early hours of the morning or late in the evening to drink from a river or a stream. It lives in dense, tropical deciduous forests, and is exclusively vegetarian. Its range extends over south-central Bhutan and northwestern Assam. Easily seen on the Bhutan side of the Manas river, it is a shy animal that leaps from tree to tree at the approach of humans. A troop can have as many as 40 animals, and the movements are controlled by a dominant male who moves fast, followed by the rest. Juveniles make a shrill, nervous, whistling sound before jumping, but otherwise they move and feed in relative silence.

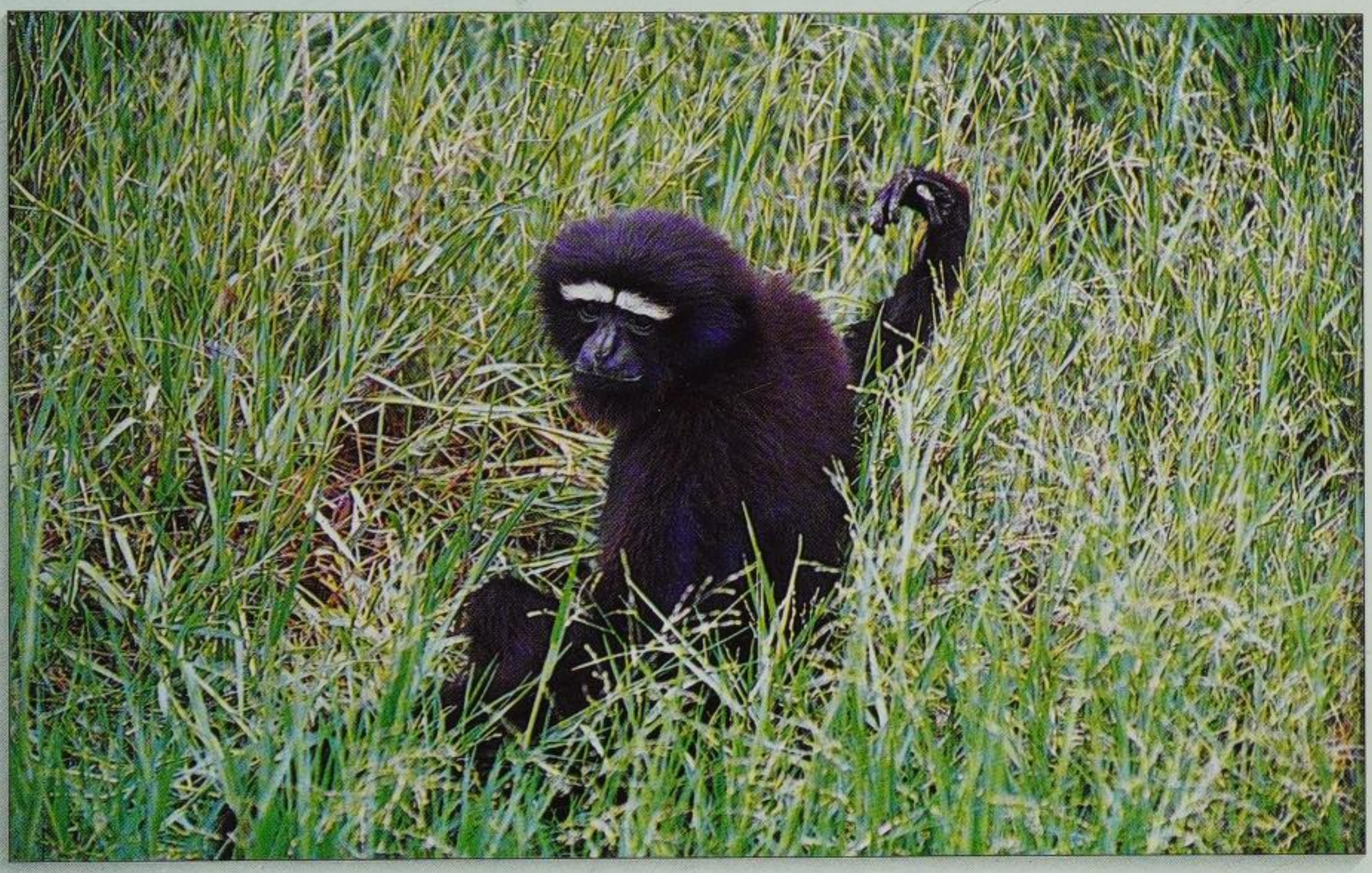
The range of the **capped langur** *(Presbytis pileatus)* extends further east from Manas, covering northern Assam, Arunachal Pradesh and parts of Bangladesh. A large, colorful monkey, it has a black face and head with sharply contrasting paler cheeks suffused with red. The dorsal color is gray to blackish-gray and the distal half of the tail too is black. The ventral parts are a brownish-yellow or orange, while the insides of the thighs and the hindquarters are tinged with light cobalt-blue, this tinge being more prominent in adult males.

Little is known of the habits of the capped langur, but they prefer dry tropical forests and dense evergreen jungles. Only during the dry season do they leave the sanctuary of the trees to drink. They are extremely shy, either taking flight through the trees or sitting absolutely still when approached. Left alone, they are noisy animals, and very often it's the *whoosh* of a branch bending under their weight as they leap that gives them away.

Yet another species of langur, the **silver leaf monkey** *(Presbytis cristatus)*, is found mainly in southern Burma, but may also extend its range into Tripura and Bangladesh. However, no record of it has been made in the subcontinent in recent years, but the possibility of its existence here cannot be dismissed.

Finally among the Indian primates are the lesser apes, though represented by only one species, the **Hoolock gibbon** *(Hylobates hoolock)*, which is found in the rainforests of Arunachal Pradesh, Assam and parts of Nagaland. When standing erect, it reaches just under 91cm (3 ft). It has small legs on which it runs, sometimes along the boughs of trees, but usually it prefers swinging from branch to branch, using its grotesquely long arms. Adult males are dark brown while adult females are blonde. Young males and females are black with a silvery white band above the eyebrows.

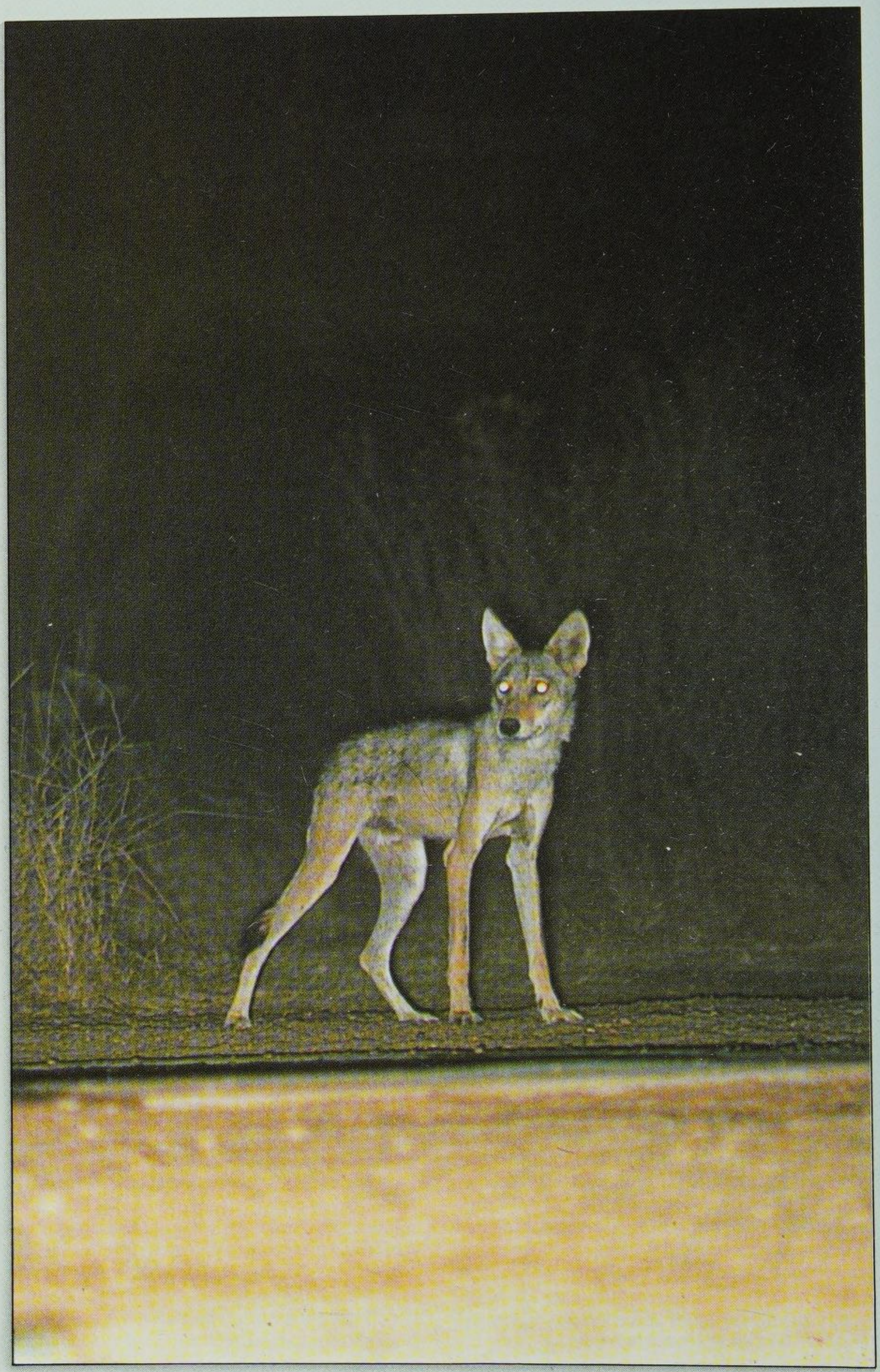
The Hoolock gibbon's habits in the wild are relatively unknown. Each group is usually a family, with each adult male having a single female consort. It feeds on fruit, leaves, young shoots and birds, and is known to have a special liking for spiders. The Namdapha Tiger Reserve in Arunachal Pradesh is probably one of the best areas in which to look for gibbons. Their loud whooping early in the morning carries a considerable distance and is one of the most evocative sounds of the jungle.



But the gibbon, like many apes throughout the world, is also facing a stiff challenge to its survival, as pressure for land and timber mounts. As India's only ape it must merit special protection, similar to the projects for tigers and elephants that are already in place.

In general, primates in the region have so far been lucky, living under the protection of a religious umbrella, as it were. Nevertheless, as traditional protection afforded by religious belief in their sacredness wanes, the future, not only of the Hoolock gibbon, the langurs and the macaques, but also that of the lesser primates, will be increasingly threatened.

Left, toque macaque, Sri Lanka and above, Hoolock gibbon is the only ape found in India.



THE DOG FAMILY, HYENAS AND BEARS

Stories like "Little Red Riding Hood" featuring the misdeeds and cunning of the wolf are widespread. Told to us at a tender age, they inevitably plant the seeds of fear of the wolf into our young minds. It is easy for us to picture the wolf of the story – the large ears, the fangs and everything else that builds up this rather misleading picture. Not surprising then, most women in Bihar even today keep the children at home with stories of the wolf, for even the tiger does not command the respect most *Canidae* do.

The dog family: In India, the *Canidae* (as the dog family is known) are among the most widely distributed of all beasts of prey. A near relative, the **striped hyena**, is mainly a scavenger by habit, but will on occasion attack an animal if it can be overcome easily. Unlike the cat family, the paws are tipped with nails that are non-retractile, and this is one of the characteristics which points to a relationship between dogs and bears. To find any further resemblance, one would have to go back to the fossil remains of primitive animal forms which suggest a common ancestral stock.

The different modes of life adopted by their forebears led to differences in structure and habits which are now so apparent in the two families. While the progenitors of the wolves, jackals, foxes and dogs became hunters who took their prey by swift and enduring chase, the ancient bears probably lived as they live now – feeding on grasses, roots, herbs, fruits and insects. Yet the bears still retain the ability to kill for food, and a bear will eat meat whenever an opportunity is offered.

The *Canidae* are among the most efficient predators in the world – with the exception of the jackal, which lives mainly off carrion – and their physical evolution has built them into efficient killing machines.

A long pointed muzzle with large erect ears, a well-shaped head, deep-chested muscular body and a bushy tail enable them to secure prey by swift and open chase. The feet are equipped with five toes, including the dew-claws, and the toes, resting on deep, well-cushioned pads, are held close together by elastic-rimmed webs. *Canidae* do not rely on their feet for striking at their prey, or even gripping it – their feet are designed solely with one specific purpose – to follow prey over hard ground.

Besides the ability to outlast their prey over a large distance for which their lungs are well developed, the main weapon for attack is the powerful set of teeth set in equally powerful jaws, which allows for a tenacity of hold that is their mainstay in attack. With a few exceptions, most dogs have a great array of 42 teeth and a powerful set of cheek muscles gives them a vice-like grip. Interlocking canines and incisors form formidable weapons for seizing or lacerating live prey, and the latter are well adapted for biting, gnawing, or stripping the skin from flesh. Further, their cheek teeth also help adapt them to a vegetable diet for, meat eaters as a rule, *Canidae* also live off grass, herbs and fruit.

The dog family is among the most diversely distributed species throughout the world. The animals found in the subcontinent do not differ in essential habits from their cousins in other parts of the globe, the marked difference being only in size and local coloration.

Food habits also depend largely on local conditions, as do the number of animals living in a pack. It is a well recorded fact that a pack of wild dogs living in a certain area will sometimes swell, then decline again, leaving a more or less constant population. Food relationships within the pack are a complex business, and any undue increase or decline in the number of any one species affects the lives of many others.

A highly developed sense of smell and keen eyesight are two of the most prized assets of the dog family. All are nocturnal, though most kills are made either in the late afternoon or at dusk, leaving people to argue about their nocturnal habits. Within their own packs, they have an advanced communication system; **dholes**, as wild dogs are known in India, communicate with each other by whistling, and the pack will usually set a perfect ambush, meeting with a higher rate of success than some of the better-known carnivores. For foxes and other animals that do not live in packs, the prey is usually rodents and small animals. For them, their speed is more a method of escape, though in the case of jackals, wolves and even hyenas, "playing dead" is yet another method of escape.

The dogged hunter: The dhole, or the **Indian wild dog** *(Cuon alpinus)*, is perhaps the most widely distributed of all species. Three races are known to us, a trans-Himalayan race that are paler, the deeper red species of the Himalaya and the tawnier peninsular form. Their range in India starts from Ladakh where they are said to hunt wild sheep and goats. In the lower reaches they inhabit forested area. They prefer hunting by day, though on rare occasions they will hunt at night also. Like wolves, they too hunt in packs that are usually family groups, the social life originating from a prolonged association between parents

The much-maligned wolf is now a rare sight.

and their young, well-looked-after offspring.

Once on the trail of the unfortunate victim, their prey is followed by scent in silence, though in heavy cover the yaps of the leader indicate the line of approach. Once the animal is in visual contact, the pack often breaks out into excited whimpering and yapping, panicking the herd ahead to stampede. In the chaos that follows, an individual is guided away from the main body and then brought down ruthlessly. Large packs are known to have taken on animals like the gaur and the buffalo, and records of tigers being killed by dholes also exist. The tiger is not hunted by dholes, a battle usually taking place more out of a chance encounter than anything else.

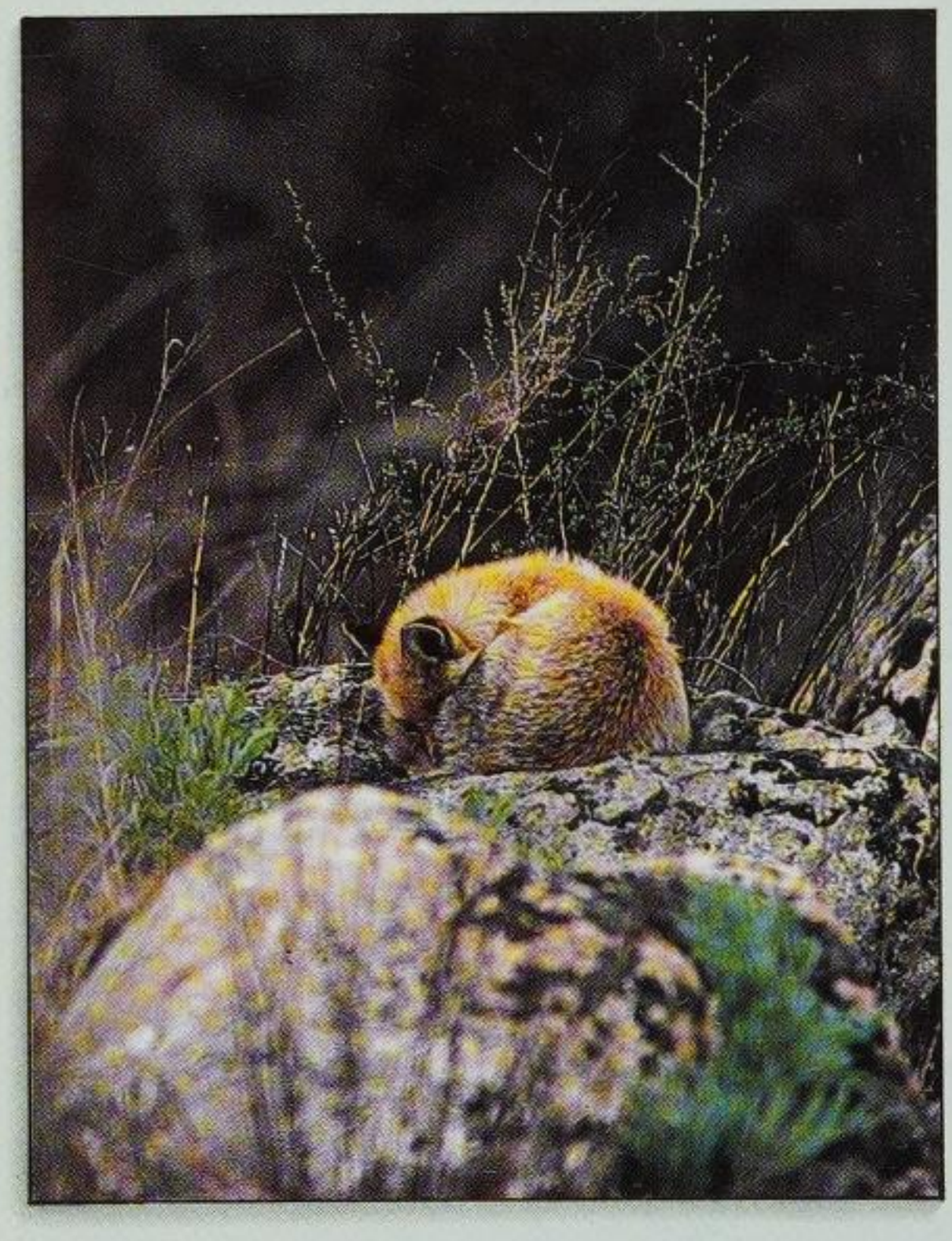
Until a decade ago, accused of killing more than they could eat, wild dogs were considered vermin and many state governments offered cash incentives to hunters to wipe them out. *Shikaris* of yesteryear often talked of an absolute "stillness" that would set in in their shooting blocks when dholes appeared. "You might as well go home," one would often be told; but of late, dholes have often been observed close to a potential prey-species, both seemingly unconcerned by the other's presence. On the other hand a herd of over 300 chital has been observed to run blindly through a human habitation when wild dogs appeared. Maybe, both the hunter and the hunted know when the former is on the lookout for food.

Big and bad?: The **Indian wolf** *(Canis lupus)*, unlike the dhole, is not often seen as its habitat has suffered adversely at the hands of humans. Its range extends from Ladakh and Kashmir into the desert zone and the dry open plains of peninsular India. Found more in the bare and open regions, the wolf has often come into conflict with humans for it is not averse to attacking livestock. In Bihar's Hazaribagh district and in Karnataka, wolves have occasionally taken to man-eating, lifting small children of up to 12 years of age from their homes. It is perhaps interesting to note that in the Hazaribagh Gazetteer published in 1910, the government then offered Rs 50 to anyone killing a man-eating wolf, which was twice the amount offered for a man-eating tiger.

Its size, large skull and teeth distinguish the wolf from the rest of the family. Animals from the plains of India have sandy fawn coats stippled with black. The wolves from Ladakh, in contrast, have predominantly blackish coats in the summer, and their winter coats are variegated with long, black and white or black and buff underwool.

In the Indian desert they shelter from the heat in burrows dug in the sand dunes, or they remain above ground, lying up in fields or patches of scrub and thorn forest – they will hunt wild goats, sheep and deer, but will also live off rodents during the lean periods. Their shrinking habitat in most parts of the country and the constant conflict with humans has reduced their numbers dramatically.

Camp Followers: The long-drawn, eerie howling of the **jackal** *(Canis aureus)* at dusk or just before dawn is perhaps more familiar to most people than the animal itself. Three races occur, and it is found throughout India and Sri Lanka. Its closest relative is the wolf, but it is much smaller in build,



"MAN'S BEST FRIEND"

To protect his sheep, cattle, poultry and, sometimes, even his children, man, all over the world, has so ruthlessly hunted down and killed the wolf that, over large areas of the earth's surface, including many parts of India, where it was once very common, it has been totally exterminated. As human settlements encroach on the wilderness, the wolf retreats into the more sparsely inhabited wastelands.

Ironically, the domestic dog, often described as man's best friend, is believed in all likelihood to have developed mainly from the wolf, the animal man has sought so relentlessly to exterminate.

Like wolves, domestic dogs go round and round before settling down. But, oddly enough, though jackals do not do this, they wag their tails when happy just as dogs do, and some naturalists believe that jackals *did* contribute to certain strains of dogs.

and lacks the arching brows and elevated forehead that give the wolf a noble look. The Himalayan jackal has a slightly darker coat, but by and large they are pale and tawny with a bit of white and black around the shoulders, ears and legs.

Perhaps the most nocturnal of all *Canidae*, jackels usually come out as dusk creeps across the subcontinent. On a cloudy day, they will sometimes come out earlier, and in very hot weather, they may make a daytime trip to a water hole.

Kalighati watchtower in Rajasthan's Sariska Tiger Reserve is an excellent place to observe these animals, of which very little is known. In jungle terms they are referred to as "camp followers" and tales of the jackal following meekly in the wake of the largest predator of the Indian jungle, the tiger, are common to Indian folklore. Jackals play an important role in clearing carcasses and offal, but they sometimes gang up into a pack and attack deer fawns or antelope in a manner similar to that of dhole. They also feed on fruit and some vegetables, and prefer to live around towns and villages, contributing in a large way to village sanitation.

Wily elegance: The richly colored fox of the Himalaya, the **red fox** *(Vulpes Vulpes)* is one of the most attractive animals. Its long silky fur and superb bushy tail, with the black of its back continuing to the upper half of its ears, and the white tip to its tail, distinguish it from the Indian fox of the plains. Red is the dominant color of its lovely coat through local variations from gray to yellow occur.

Three races are recognized in India; the **hill fox** of the Himalaya, which ranges from Ladakh and Kashmir to Sikkim; a northern desert subspecies and the western desert **whitefooted fox**, which ranges from Rajasthan to Kutch.

Red foxes are said to pair for life and they occupy the same den year after year. They live in thorn bushes and willows fringing the edges of streams and are sometimes found in cultivated areas.

The occasionally venture out during the day but usually hunt at night, generally alone or at the most with a mate. They prey chiefly on rodents, which include squirrels, and they also take a toll on ground birds, like the chukor, partridge and pheasant. In winter, driven by hunger, they will sometimes raid human habitations for food, picking up offal and other tidbits of food.

Left, a hill fox in Kashmir and above, an inquisitive desert fox.

The **Indian fox** *(Vulpes bengalensis)* is the common fox of the Indian plains, smaller and more slender than the red fox. Its tail has a black tip and its ears are not black as those of the red fox. Its coat too is never as luxuriant, and the general or dominant color is gray. It ranges through the entire country, from the foothills of the Himalaya to Kanyakumari. It will sometimes attack poultry, and feed off rodents and insects, shrubs and berries. It will gobble up emerging termites as they take to the wing, and by its constant destruction of rats and other pests, it is of great value to the farmer. It rarely enters forested areas, preferring the cultivated areas near a canal, using a bund

to live in. Its main defense is its speed and nimble turning ability – it will also double back on its own tracks to throw trackers off balance.

Ungainly scavenger: The build of a hyena and its dog-like appearance would suggest it to be part of the *Canidae.* Its legs and feet are similar to those of a dog but the structure of the skull, the teeth and other points in the anatomy of the animal would place it in the cat family.

A sort of a link between the two orders, the hyena at first sight looks like an ungainly dog. A scavenger by nature, it seeks food entirely by smell, its sight and hearing being almost defunct. It too is a camp follower, but gets to the kill after the vultures and jackals have had their fill, feeding mainly on bones and coarse remains – its powerful jaws being perfectly adapted for bone crushing.

ing chatter, and though some photographs and notes have been taken of its denning behavior, little else is known about these animals. Supposedly common, they are rarely seen, mainly because of their nocturnal habits, and they too have been reported to indulge in man-eating, snatching babies occasionally from the doorways of houses.

Big climbers: If the hyena resembles a dog in its physical appearance, a bear has little of the physical characteristics that make the dogs deadly predators.

It has massive limbs that are more suited for climbing than for running and it uses its huge claws to grasp branches and to dig for roots. It feeds on roots, insects and will feed on carrion if an opportunity presents itself. It has an extremely poor range of vision and its hearing isn't too sharp either. It has a large, thickset head with small eyes

In the subcontinent, the **striped hyena** *(Hyaena hyaena)* extends its range through forested districts, open country and ravines. Often a hyena will enlarge a porcupine burrow where it lies through the day, foraging for food almost exclusively by night.

When searching for food, a hyena will tramp along with its awkward, ambling gait and once it has located a kill, it will stand its ground to hold it against even the rightful owner. Although it is no match for the tiger, it is known to have often taken on panther successfully. It is otherwise a shy animal, avoiding a confrontation with domestic dogs and it often resorts to "playing dead" to get away, for its persecutors lose interest in a seemingly lifeless body. It is famous for its laugh-

and rounded ears and a tail so small it is barely noticed. Even among the bears, each species has different powers of scent and sight, a brown bear being able to pick up the wind-borne smell of humans a mile off while the sloth is notoriously short-scented. Dull in all other senses except the sense of smell, bears are, not surprisingly, usually relaxed and, at first appearance, easygoing.

The **sloth bear** *(Melursus ursinus)* is a shaggy creature with long unkempt hair and squat hind legs, its long muzzle and lower lip giving it an uncouth look. The tip of the muzzle is dirty white and it has a V-shaped breast patch. Its range extends from the base of the Himalaya to the forested tracts of Assam, down to Sri Lanka. It prefers areas with cover and rocky outcrops to

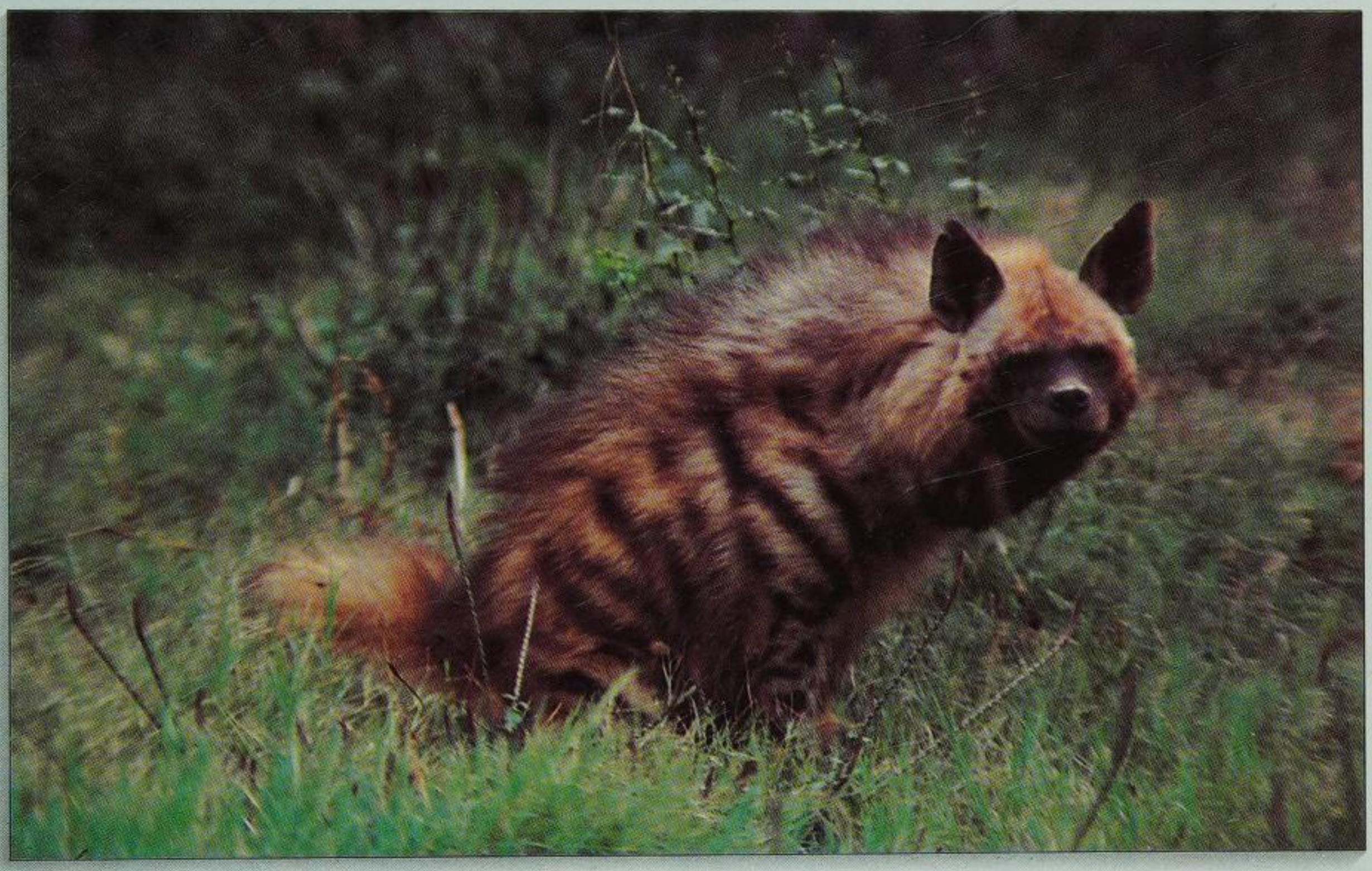
shelter in, and it usually emerges at dusk to feed through the night.

During the monsoon a sloth relies heavily on an insect diet, and to see it attacking a termite mound with the accompanying sound effects is a sight one can rarely forget. Sloths living around human settlements seem to delight in raiding maize crops and sugarcane. Where date palms are tapped, they climb trees to attack the toddy. The sloth is the common performing bear used by itinerant entertainers for roadside shows. Usually quick to run away when threatened, a female with cubs is a dangerous proposition for she gets extremely hostile and savage. Indeed, when angry, the sloth bear is one of the most dangerous animals on the subcontinent.

The **brown bear** *(Ursus arctos)* is of a much heavier build and its brown coat distinguishes it from the Himalayan black bear. The bare open meadows above the tree line in the Himalaya is the home of this bear. It hibernates during the cold winter months in caves on the rocky slopes. It spends much of its time looking for insects under rocks and will stalk voles and marmots, which it digs out of burrows. Shortage of food at these altitudes drives it to eat carrion, and in Zanskar a brown bear was once seen fighting off Tibeten ravens while it fed on an ibex that had died earlier of natural causes.

Brown bears have never been known to attack humans, but it can be disastrous if one of them gets into a sheep pen. Reports of the yeti in the Himalaya have been attributed to sightings of the brown bear. A "yeti scalp" in one of the monasteries of Nepal proved to be that of a brown bear. The Tibetan blue bear is also reported in the same area, but this animal is an almost unknown species.

Finally, in the lower reaches of the Himalaya is found the **Himalayan black bear** *(Selenarctos thibetanus)*, which is almost jet black in color with the typical V-shaped mark on its breast. Found in Kashmir and in Assam, it favors steep forested slopes and can be found up to 12,000 ft (3,600 meters), or as low as the *terai* jungles. It is nocturnal, but is surprisingly active by day in Kashmir's Dachigam National Park. It attacks if surprised and many people have been mauled and killed.



Left, dholes or wild dogs are amongst the most efficient hunters in the wild. Above, the striped hyena is distributed throughout India.

Himalayan black bear prefer fruit for a diet and in October, when the oak flowers in Dachigam, they are literally all over the place – sometimes a 2–3 mile (3–5 km) walk yields almost a dozen animals. These bears are able to climb trees with great ease, and have a strange technique of climbing down, that is carefully making their descent until a few feet are left, then landing with a thump as they seem to lose interest. Sometimes, cubs stay with the mother, which explains small parties of three or four; otherwise these bears are solitary, sleeping in rocky nests and hollows of trees.

The black bear found in Assam is marginally smaller, although, a good population of these animals still exists.

SOME OTHER MAMMALS

Bears: It comes as a surprise to many that bears and dogs come from the same ancestral stock. Neither their appearance, nor their habits, show any close affinity. Yet fossilized remains reveal a close relationship. The explanation for the subsequent differentiation could lie in the fact that dogs became hunters and therefore developed the necessary lines and limbs to help swift movement, whereas bears probably lived, as they do now, on insects, termites, roots, fruits and honey, and therefore developed heavy bodies and strong paws to facilitate digging and climbing of rocks, cliffs and trees.

In general, bears have large heads unusually small eyes and round ears. The large bodies and heavy limbs are covered by a shaggy coat. They have very short tails. Their prime sense is that of smell. Their senses of touch, sight and hearing not being well developed, bears can very often be taken by surprise. In such situations their reactions are unpredictable and bears are often known to attack even when approached gently.

Bears lumber along with a shuffling gait and walk miles every day in search of food. When frightened or alarmed, they can gallop at a fast though clumsy pace. All bears are good swimmers. It is interesting to note that their footprints are very similar to those of man.

Bears find much of their food on the ground or just below the surface. Their long, curving claws, longer in the forefeet, are well-adapted for digging. Their mobile, protruding lips are used to suck up termites from their deep galleries. Their padded feet and inward-turned forepaws are suitable for climbing. The belief that bears are vegetarian is mistaken; they eat a varied diet, occasionally including animal flesh. Another popular misconception is that bears kill by hugging their victims. Actually, they usually swat the enemy with a swinging arm blow, like a boxer's "hook," and digging claws deep, they scalp the victim and then disappear as quickly as they can.

Some types of bear hibernate during winter to avoid the cold, but more often it is a means of surviving a period of extreme shortage of food. The heart action is reduced almost to a standstill and all body functions are suspended. No energy is expended and, therefore, no food is required. With the coming of spring, bears emerge from hibernation in good health.

The **sloth bear** *(Melursus ursinus)* has inhabited India from very early times. Bear fossils have been found here. Originally confused with the sloth, scientists have now classified it under a separate genus in view of differences in skull structure and the fact that the two middle incisors are missing in the upper jaw of the sloth bear.

Though widely distributed over India and Sri Lanka, this bear, oddly enough, does not extend east of Assam.

The animal is 4–5 ft (120–150 cm) in height and weighs an average 250 lbs (115 kg). With its shaggy, dusty-looking black fur, it looks somewhat uncouth. It has a V-shaped patch of white on its chest, which is a distinguishing feature. To add

to its untidy appearance, it has a mangy-looking face, round eyes with hairless lids, and a long, dull-gray snout with protruding, pendulous lips. Its bowed forelegs with inward-turned forefeet make it a specially good climber. For no apparent reason, the tall *Terminalia arjuna* is its favorite tree. Claw marks on trunks and branches are proof of this. The long, 4-inch (10-cm) ivory-white claws on its forefeet are perfect digging implements. Large and muscular, a sloth bear has great power and vitality packed into its huge body.

The sloth bear is mainly nocturnal, spending most of the night rummaging for food. It can smell buried food and can be seen digging furiously to get at even one tasty grub. It is very intelligent and

Left, the handsome red panda is distributed throughout the eastern Himalya. Right, one of the several species of squirrel.

remembers the seasons and places where its favorite food is found. Wild fig, jambul, ber, bael, mohwa, amaltas and ebony fruit are all well-liked.

Small groups of sloth bear have been seen seemingly drunk on the heady fermented juice of mohwa flowers. It has a very clever way of grabbing honeycombs. In the darkness, it climbs a tree on which honeycombs hang and knocks down a single comb with a firm swipe of the paw, probably realizing that it cannot manage more than one at a time. The bees, confused in the darkness, buzz around the branch or settle on other combs, while the bear happily sucks the honey and eats the grubs in the comb that has fallen to the ground.

Termite-hunting is a bear's major occupation. Using its powerful paws to tear down the mound, the bear reaches the termites at the bottom. It puffs and blows away the dust and sucks up the termites with great skill. Its overhanging upper lip is pressed back against the nostrils, protecting the animal from inhaling dust. As if designed for the purpose of clearing a passage for suction, there is an empty space at the point where one would expect the two middle teeth of the upper jaw to be. A concave palate facilitates the process.

The sloth bear grunts and squeals loudly while turning over stones in a stream, eating grubs and insects with its blubberous mouth. It grunts very differently when angry.

The sloth bear mates in the hot weather. Two cubs are born in the winter, after a gestation period of seven months. The mother bear carries the cubs on her back and looks after them till they are 2 or 3 years old. Male bears move away from the group and lead a solitary existence.

Sloth bears are hunted for their fur and their gall bladder, which is said to have medicinal properties. They are also captured and trained to perform. It was only in the early-20th century that people took to hunting the sloth bear. Before that they were to be seen in immense numbers.

The **Himalayan brown bear** *(Ursus arctos)* is seen in different sizes but all are of a heavy build. An average male can measure 5 ft 8 inches (170 cm) in length. The coat varies from a rich dark-brown in summer to a tawny, worn-out brown in old animals. Its white-tipped fur sometimes gives it a silvery sheen. It has a heavy underwool during winter. It lives in the cold north temperate zone in the higher reaches of the northwestern and central

Himalaya, among the bare peaks above the tree line. It hibernates in winter and in spring lives on new grass shoots, insects, voles and marmots. Since food is scarce in its habitat it also attacks sheep, goats, ponies and livestock.

The brown bear rarely climbs and usually picks its food off the ground and digs in search of tubers and roots. Berries, wild fruit, peaches, apricots, apples, mulberries and walnuts offer a welcome change of diet. The mating season is in summer. Cubs are born in December and remain with the mother for 4 to 5 years.

The **Himalayan black bear** *(Selenarctos thibetanus)* is smaller than the brown bear. It has a smooth black coat, black claws and a brown muzzle with a white or buff lower jaw. A promi-

nent V-shaped patch of white or yellow is seen on the breast. Found in Kashmir, the Himalaya and Assam, this bear lives below the tree line, around 12,000 ft (3,660 meters). In winter it comes down to 5,000 ft (1,525 meters). It is a good climber and gets most of its food off fruit trees. Pears, apricots, berries, honey, corn, insects, termites and larvae of beetles, make up its varied diet, but sheep, goats and even larger cattle are attacked and eaten by this nocturnal predator. It attacks and mauls even human beings in self defense.

The mating season is in late autumn. Two cubs are produced near spring. They remain with the mother for a year or two. Bears are sometimes seen with four cubs. These must belong to two successive litters.

Pandas: Although pandas resemble bears in many ways – round heads, heavy bodies, short legs and a bear-like gait, they are classified under the order *Procyonidae*, which includes the racoon, the North-American carnivore.

The **giant panda** *(Ailuropoda melanoleuca)*, which occurs in China, has not been seen in India. The **smaller panda**, which resembles the giant variety, is found in India. The **red panda** or **catbear** *(Ailurus fulgens)* looks like a little like a racoon, with a very long tail. It has a round head, upright pointed ears and a short muzzle. It has a glandular sac near the anus. The soles of its feet are matted and hairy, as in the case of the polar bear. It is rich brown in color, with alternate brown and white rings on its bushy tail. Its face and lower lip are white and a prominent red stripe from the eyes to the nape of the neck is its distinguishing feature.

Found in Nepal, Sikkim and the Eastern Himalaya, the red panda lives at altitudes above 5,000 ft (1,525 meters). Adept at climbing, it is arboreal and gets a good grip on branches with its well-formed toes and semi-retractable claws. Large molars, with many pointed edges for grinding food, are assets for its almost totally vegeterian diet – roots, grasses, leaves and fallen fruit. On rare occasions it will also eat eggs, grubs and insects as supplements to its normal diet.

A fine sense of smell, far better than its sight and hearing, is its main guide. When excited, a strong odor is ejected by the anal gland. A scent trail is left on trees and other surfaces to enable one panda to find another, an activity most probably linked with the mating season.

Not much is known of the red panda's breeding habits or its period of gestation. Two young are normally seen in spring. The mother, or sometimes both parents, look after the young for a year.

Left, tiger, mouse and otter skulls and above, Himalayan black bear ocassionally feed on carrion.

Pigs: Pigs, peccaries (a South American hog-like animal) and hippopotamuses form an order called *Artiodactyla*. In India only two subspecies of pig are now found – the wild boar and the pygmy hog.

Wild Boar *(Sus scrofa cristatus)*: Of the six or seven species found earlier on the subcontinent, this is now the only one found in India. It is a large, heavily built animal, the male averaging 36 inches (90 cm) in height and 200 lbs (90 kg) in weight,

though 38-inch (95-cm) and 500-lb (225-kg) specimens are not uncommon.

The typical feature of a pig is its elongated, suddenly truncated, movable snout, ending in a flat disk-like surface supporting the nostrils. The upper canines grow upwards and outwards. These are dangerous appendages used to great advantage by the boar. The most distinct difference between the Indian boar and its European counterpart is its grayish-black coat which is very sparsely covered with hair. However, it has a fuller crest or mane of black bristles rising from the nape of its neck and running to its hind quarters. When it scents danger, this crest stands up as an impressive erect ridge of angry bristles along the back.

An immense area covering India, Burma, Thailand, Sri Lanka and West Malaysia is the home of the boar. Scanty bush jungles, forests with clearings and grassy areas are its favorite haunts. It always lives in the proximity of water and enjoys wallowing in shallow pools but not in slush like the buffalo. It is a noisy animal and grunts loudly when it fights, and when it sharpens its tusks against tree trunks and other hard surfaces the squeak and clatter can be heard from quite a distance away.

The omnivorous pig eats a variety of food – roots, tubers, insects, mollusks, offal, carrion, small mammals, and even the remains of a tiger-kill. It is also a determined crop-raider and attacks cultivated areas near the forest edge. A field of peanut could be uprooted by a sounder in a night, the boars digging up the roots with their snouts.

The sharpest sense in a boar is that of smell; its sight and hearing are mediocre. It is noted for its courage and determination, its self-possession, and its daring. It is one of the few animals that can stand up to a tiger. Many cases are known of tigers, despite their agility and strength, being gored to death by a ferocious boar. Bleeding and torn boars are known to have kept up the fight, showing a rare tenacity and a grim determination to survive. During the day, the boar is not as self-confident as it is at night. Surprised in broad daylight, it prefers to bolt.

The boar's high intelligence becomes evident when it moves to new grounds cautiously following deep *nullas* (water-courses) to avoid detection or camouflaging itself under lone palms or clumps of bushes.

Pigs do not seem to have any fixed breeding cycle. Dunbar Brander has described how in Central India he saw during the spring rut a congregation of about 170 animals that formed a circle in a forest clearing. In the arena were two master boars locked in combat, two others seemed to have just finished. In all there were 11 master-males competing quite obviously for the best sow. A notable feature of the fight was that it seemed a clean contest, governed by rules, and not just a matching of brute strength. The gathering looked on calmly.

A sow bears four to six young in a litter, after a gestation period of four months. Before the birth, she builds a comfortable shelter. With tall grass or bamboo, she lays out a circular pattern with the heavier ends on the outer edge. She then burrows

below the material she has laid down thus making a chamber under a protective roof. In this snug room she has her young and shelters them.

An abundance of pigs was once found in Indian forests. Pig-sticking and hunting have reduced their numbers. The wild pig is popular prey for those who fancy its protein-rich-meat – humans, tiger, leopards, crocodiles and wild dogs attack it. Destruction of its habitat is another factor that has affected its numbers. However, in parts of Madhya Pradesh such as Bandhavgarh, sounders of up to 70 are again being seen.

The **pygmy hog** *(Sus salvanius)*, only 10 inches (25 cm) high, is the smallest of all pigs. Short-tailed, with small ears, a short snout and upper tusks, it has a coarse, blackish-brown, scanty-haired coat. By and large, its ways are similar to those of a wild boar.

tan, parts of Bangladesh and the Kamrup, Goalpara and Darrang districts of northern Assam. Although not seen there for many decades it may still occur in the *terai* forests of Nepal, Uttar Pradesh and Bihar. It can be seen at the Manas sanctuary.

Mongooses: These were originally classified under the civet family. However, since various distinctive features have been observed, they have now been grouped in a family by themselves, the *Herpestidae*. A long body, short limbs, a long, bushy tail, and bright beady eyes are characteristic of the mongoose. Its ears are small and form neat semi-circles close to the head. Its ear is admirably structured and consists of many folds, which tightly close the opening of the ear. This is probably a natural protection against the dust that is raised when the mongoose burrows into the earth.

First classified by Hodgson in 1847, it lives in thinly populated savannas as well as areas with tall thatch-grass, rainforests in the tropics, and deep niches within primitive forests. It moves in groups of five to 20. It has nocturnal habits and feeds on roots, bulbs, insects and lizards.

The young appear in April–May. A litter of four is normal.

Human settlements, ruthlessly infringing on the pygmy hog's natural habitat, have endangered the species. Rediscovered in 1971 in the *dooar* grasslands, it was later reported in southeast Bhu-

Left, wild boar feeding on a hangul carcass and above, long thought to be extinct, the pygmy hog was discovered in 1971.

Its strong predatory instincts make the mongoose a good hunter. It preys on hares, rats, mice, snakes, frogs, lizards, crabs and grasshoppers and is partial to birds' eggs. Roots and berries also form part of its varied diet, though it shows a strong preference for meat. Its sharp-edged, blade-like teeth are made for meat-tearing and cutting. The prey is bitten, crushed and then eaten. Sometimes, the mongoose drinks the blood of its victims. It often sucks eggs after piercing a hole in the shell.

Unlike cats, which stealthily surprise their prey, the mongoose attacks openly and directly, pouncing relentlessly on its victim. It follows its quarry by its scent and tracks it down to its burrow and digs it out. Its body seems built for the purpose,

with strong forefeet and well-developed digging claws. Though it is a low-strung animal, it gains height for a quick look around by standing on its hind legs.

The mongoose has a reputation as a killer of snakes, including the deadly cobra. It is its agility that enables it to avoid the snake's bite. Also, when excited, its hair bristles and this makes it seem larger than it really is, thus baffling the enemy. Cautiously, the mongoose waits for an opportunity to overpower the snake. In that split second when the snake lowers its head after an attempt strike, the mongoose snaps on to the back of the snake's head and crunches it to death.

When the opportunity offers, a mongoose will kill more than it can consume – out of sheer excitement. Domestic poultry are often their victims, which somewhat strains their relations with humans, but this has to be weighed against the immense good they do by keeping the numbers of rats, mice, snakes, insects and scorpions under control.

The **common mongoose** *(Herpestes edwardsi)* is yellowish-gray in color. It has a grizzled coat and tail, with a white or yellowish-red tip. Common all over India, Nepal and Sri Lanka, it is found on open land and in scrub jungle where it lives in thickets. It is diurnal and can be seen scurrying along even at the hottest time of the day. It breeds thrice a year, three to four young being born after a gestation period of two months. The mother is often seen moving with the young in a family group.

The **ruddy mongoose** *(Herpestes smithi)* is about the same size as the common mongoose. It is not seen very often as it lives in forested areas. Its distinguishing feature is the black tip on its tail.

The **stripe-necked mongoose** *(Herpestes vitticollis)* is the largest of the Asiatic mongooses. It is distinguished by a black stripe that runs along its neck from ear to shoulder. Its coat is a rich, gray color highlighted with red tips. It is found in clearings of swampy areas, near running water, or in open scrub country, from where it sometimes enters forests. It has a keen preference for a meat diet and hunts chital fawns, mouse deer, hares, field rats, bandicoots, frogs, fishes and crabs, but it also eats fruit and roots.

The **crab-eating mongoose** *(Herpestes urva)* is almost as long but heavier than the common mongoose. It has an untidy, rough coat of a dark-gray color. It occurs in Nepal and Assam and can be seen there near small streams, on the banks of which it hunts for crabs, deftly cracking the shell of its victim by knocking it against a rock. When attacked, it protects itself by squirting out a fetid fluid from its anal glands on its attacker.

Otters, martens, weasels and "badgers": Otters belong to a large family known as *Mustelids*, which also includes stoats, weasels, minks, martens and badgers. Otters are found all over the world with the exception of Australia, New Zealand and the polar regions. As can be expected of a group of animals that has such a varied distribution, otters vary considerably in size, ranging from the 3-ft (1-meter) long, clawless otter of the East Indies to the 8-ft (2.5-meter) long Brazilian otter. However, all of them have a number of

common features. All are largely amphibious; all have five digits on their feet and non-retractable claws. The two otters generally called clawless do in fact have rudimentary claws.

The otter is a beautifully streamlined animal. It has short legs, a thick neck and a long and powerful tail, which is its most striking feature, accounting for almost half its length. The tail is furry like the rest of its body and its main use is in swimming. When otters stand on their hind legs, the tail is used to keep balance.

While otters feed primarily on fish, they kill any prey they can handle and, indeed, range over several miles of land in their quest for food. It has also been observed that certain Indian otters often fish as a cooperative, forming a semicircle to drive fish towards the shallows.

Three species are found in the Indian subcontinent: the **common otter** *(Lutra lutra)*, the **smooth Indian otter** *(Lutra perspicillata)*, and the **clawless otter** *(Aonyx cinerea)*. The common otter, which is distinguished from the other races by its fuller and rougher coat, is found in Kashmir, the Himalayan ranges and Assam. In South India a subspecies is found. Basically a creature of hills, rivers and streams, it has been recorded at altitudes exceeding 12,000 ft (3,660 meters). Their upward migration has probably a lot to do with the migration of fish. Hunting mainly at night, they move over land from one stream to another. A characteristic often observed is that they kill more fish than they require. This is attributed to the excitement of the hunt. Little is known of their breeding habits. The young are born in conveniently located hideouts, usually beside a stream, with at least one underwater entrance. The mothers care for the young till they are nearly fully grown.

The smooth Indian otter is about the same size as the common otter but has a sleek smooth coat, which varies in color from blackish to sandy-brown. Essentially a plains otter, it has adapted itself to life even in the arid regions of northwestern India. Like other otters, it prefers living next to water, but during the dry season it can adapt itself to living off the jungle. These otters are often trained to act as decoys for capturing river dolphins. They also make engaging pets.

The clawless otter is so called because its claws are very rudimentary and do not project beyond the toe pads. This is the smallest of the Indian species and is dark brown in color (the South Indian subspecies is distinctly darker). It is found in the lower Himalaya extending up to Assam. The South Indian species is confined to Coorg and the Nilgiri ranges. Its habits and ways are similar to those of the other Indian otters, except for its preference for crabs and some other aquatic creatures over fish.

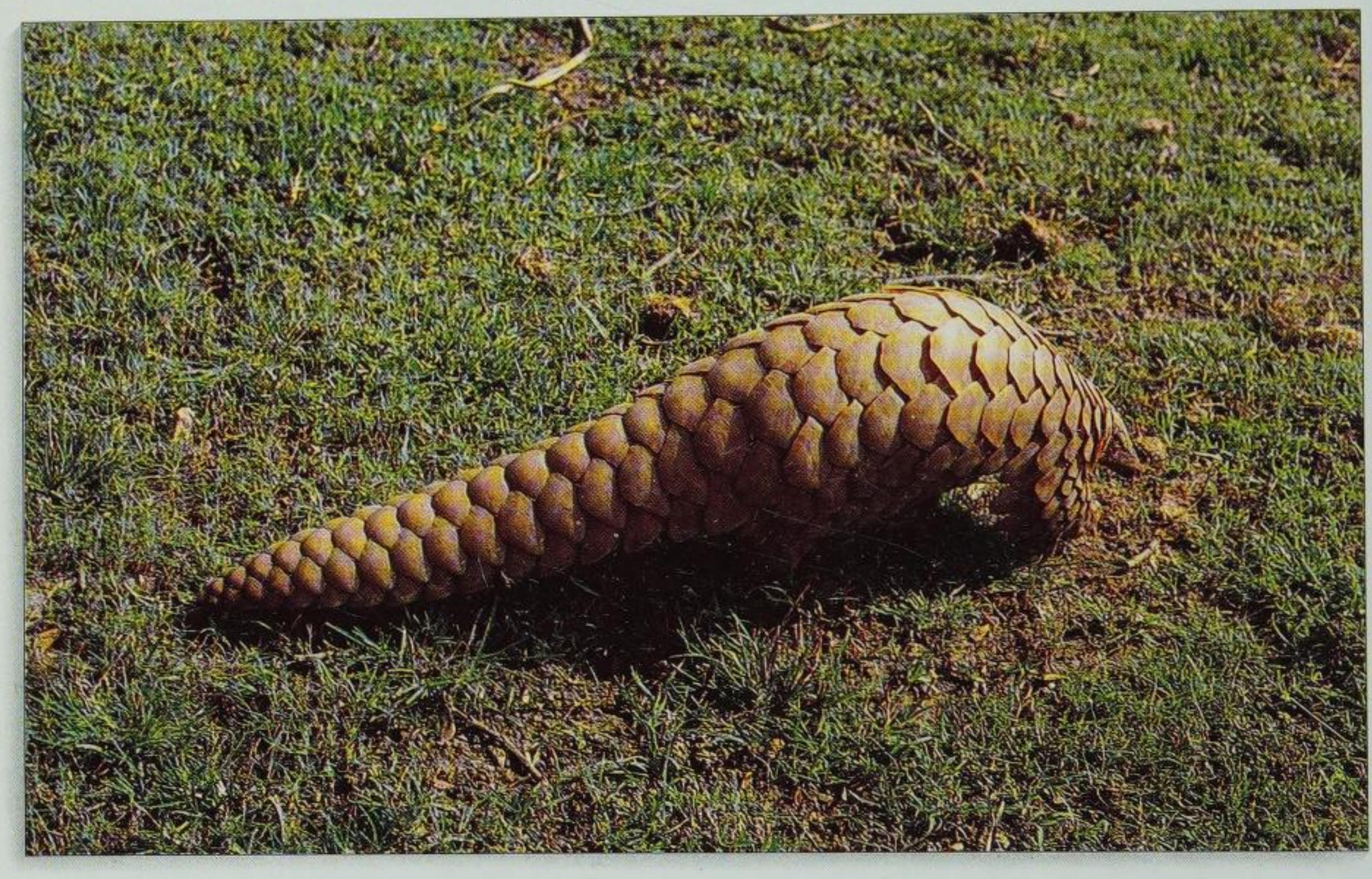
Martens are purely land animals and their feet are adapted for running and climbing trees. They prefer an arboreal existence, hunting their prey in trees. They have long snouts, large ears and a long tail that helps them maintain their balance while leaping from one branch to another. In India, two

Left, the slender loris is largely nocturnal and above, striped palm squirrels are often seen in cities.

types are found: the **beech**, or **stone marten** *(Martes foina)* and the **yellow-throated marten** *(Martes flavigula)*. The stone marten is found in the alpine and temperate zones of Kashmir and the Himalaya, as far east as Sikkim. They are rarely found below 5,000 ft (1,524 meters). They inhabit both the forest and the barren areas above the tree line. Martens in the higher regions live primarily on rodents and mouse hares. The jungle dwellers have a more varied diet of birds, honey and fruit.

The yellow-throated marten gets its name from the yellow band that runs down its neck. It is larger than the stone marten and is found in the Himalayan and the Assam ranges. It lives in the plains and hunts in the trees, where its extreme agility makes it a menace to the other inhabitants. It also hunts snakes and rodents on the ground and their prey into underground burrows, where rats and mice live. Their slim bodies are specially adapted for such activities.

True **badgers** are not found in India, though two types akin to it do exist. They are the **ferret badger** and the **hog badger**. The first gets it name from its being a mixture of a ferret and a badger. It has a long protruding snout, which it uses for probing for food. It uses its non-retractable claws for digging. It is also known for its ability to climb trees. The Indian race *(Melagale millsi)* is confined to Assam and Nepal, where it is reported to be encouraged by the local population to enter their houses to eat cockroaches and other pests. The hog badger *(Arctonyx collaris)* looks like a bear with its short stumpy legs and long powerful claws. It has a long mobile snout like that of a pig. It ends in a disk on which are the nostrils. It has a



has been known to attack young deer. The South Indian subspecies, the **Nilgiri marten** *(Martes gwatkinsi)*, is confined to the Nilgiri and Coorg ranges.

These are several types of **weasel** in India, the most common being the **Himalayan weasel** *(Mustela sibirica)*, of which there are three subspecies. Another Himalayan weasel is the **ermine** *(Mustela erminea)*, which is found in Kashmir. The **pale weasel** is found in the upper reaches of the Himalaya. Besides these, two other types are found in India, the **striped-back weasel** *(Mustela strigidorsa)* and the **yellow-bellied weasel** *(Mustela kathiah)*.

Though weasels can climb trees, they usually spend their time on the ground and often chase blackish-gray coat, pale throat and a dark stripe on the cheek. It is nocturnal and lives in the tropical forests and prefers rocky areas. Its range extends from Northeastern India to Southeast Asia. It is omnivorous. It is seclusive and is rarely seen. When attacked, it discharges a stink from its glands.

The **honey badger** or **ratel** *(Mellivora capensis)* is again bear-like with a squat body, short legs and stumpy tail, sharp teeth, strong claws and stink glands. It is tawny-white above and black on the sides and below. The underpart of the face and tail are also black. Found all over India, from the Himalaya to Kanyakumari, it lives both in deserts and deciduous forests. Ratels live where they can burrow easily. They prey on mammals, birds,

poultry, reptiles, insects, and, like bears, even eat fruit and honey. Ratels feed on carrion and are known to dig up graves. They are fearless and even attack humans in self-defense. They live in pairs and two young are produced in a litter.

Insectivores: Included under this order is a group of animals with varied life-styles like tree shrews, hedgehogs, moles and ground shrews. Small and active, these animals, with the exception of the tree shrew, are commonly nocturnal. The common features that lead to their being grouped together, other than the fact that they are insectivorous, are their tapering snout, which protrudes far beyond the jaw-bone, their short limbs with five toes each, their distinctive gait, and teeth especially suited to insect eating, all the teeth being more or less similar.

The **tree shrew** *(Anathana ellioti)* belongs to the family *Tupaia*, which in Malay means squirrel – a suitable name because, though it has the tapering snout of a shrew, it resembles the squirrel in appearance in many ways. Rounded ears, a long tail, feet well-adapted for climbing, naked soles that grip better, long toes and sharp claws are all squirrel-like characteristics. It is a rusty gray-brown on top and its underparts are near white. It is found in the deciduous forests south of the Ganga. In the eastern Himalaya and Burma, from the plains to 6,000 ft (1,830 meters), a close relative, the **Malaya** or **common tree shrew** *(Tupaia glis)* is found. Although it is arboreal and retreats to the security of trees when attacked, it feeds on the ground, looking for its insect-food under rocks, in cracks and crannies and under heaped leaves. Active and alert, it never leaps from branch to branch like a squirrel, nor does it jerk its tail and move with its head pointing downwards. Not much is known of its breeding habits and it is seen with only one young at a time. A family of tree shrews establishes territorial rights over an area and chases out all intruders.

Hedgehogs: The pig-like flattened snout of this animal gives it its name. Two species are seen in India: the **long-eared hedgehog** *(Hemiechinus auritus collaris)*, which has deep blackish-brown fur on its head and underparts and the **pale hedgehog** *(Paraechinus micropus)*, which is light-colored and has parted spines on its head.

Hedgehogs are small and can fit into the palm of one's hand. They have an odd-shaped, rounded body, stubby legs with claws used for digging, and well-formed eyes and ears. Their back and flanks are covered with closely-set spines. A remarkable facility in hedgehogs is their ability to stretch their loose, spiny skin with a muscular action to cover their head and limbs. Rolled up into spiky balls, hedgehogs manage to protect themselves.

Desert areas and the plains abound with these species. They are nocturnal and at dusk move out of their holes, which are dug under thorny bushes. Insects, worms, rats, mice, birds' eggs and lizards are their food. They cover long distances in search of it.

Moles: Cylindrical bodies, very short necks,

Left, pangolins are found south of the Himalaya and in Sri Lanka and above, the Indian Porcupine.

strong shoulders, and very large forelegs used for digging, are perfect equipment for these diminutive animals that live mainly underground. Their bodies narrow gradually to a short tail. Moles have minute eyes and their fur is so thick and soft that mud does not stick to it while they are burrowing.

The **Indian short-tailed mole** *(Talpa micrura micrura)* has a very short tail and minute eyes. It is found in the central and eastern Himalaya and in Assam up to heights of 8,000 ft (2,440 meters). It rummages for insects in black vegetable mold and eats larvae, grubs and earthworms. It lives in burrows under the shelter of trees. Another variety, the **white-tailed mole** *(Talpa micrura leucura)* has a longer tail, thick at the end, covered with white hair. It occurs in the Khasi and Naga hills.

Ground shrews: Pointed snouts reaching far beyond the lower lips, round ears, small eyes, small bodies covered with soft fur, comparatively bare tails, feet adapted for climbing and digging, and two curved front teeth are the distinguishing features of ground shrews.

The **gray musk shrew** *(Suncus murinus)* is common in India. The male has a musk gland on either side of the body and gives out a strong smell of musk, especially during the mating season. It enters human dwellings and is of help to them since it cannot tolerate rats. It also destroys insects. This shrew breeds before it is fully adult, two or three young being born at a time. They can be seen with the mother, each holding the tail of the one in front, thus forming a chain.

Rodents: More than a thousand species, each found in enormous hordes, are classified under the order *Rodentia*. They are to be found on land, in water and even in the air. Squirrels, marmots, rats, mice and porcupines are all common rodents. They are all small and share an important common feature – their teeth are specially structured and they all eat their food in a similar manner. Otherwise they present a great variety of characteristics.

A rodent's front teeth are deeply rooted and are like sharp chisels – designed for cutting. The four incisors, two each in the upper and lower jaws, are covered with a very special layer of hard, yellow enamel that does not wear out in spite of the heavy use to which they are put. Rodents have no canine teeth. At the rear end of the mouth are six pairs of molars with sharp cusps that grind the food into a paste. The gap between the front and rear teeth

serves an interesting purpose.

The animal's cheeks, that are hairy on the inner surface, can be drawn into the gap to form two chambers in the mouth. The inner hair between the two chambers acts as a mesh preventing coarse particles from passing to the rear chamber but letting more finely chewed food pass into it for grinding by the molars. All rodents break up their food by nibbling, scraping and gnawing. It is later ground by strong molars that have transverse grooves.

Easily adaptable, rodents are found all over the world and can survive climatic conditions up to heights of 18,000 ft (5,500 meters). Changes in color are therefore common. Some rodents like marmots are known to hibernate during the win-

ter, some migrate, while still others remain active even in severe conditions. Their burgeoning numbers are kept in check by predators, parasites, diseases and natural disasters.

Flying squirrels: These are arboreal and conspicuous. They have a slim build and a long bushy tail. A translucent membrane connects their limbs, forming a parachute. Although known as flying squirrels, they cannot truly fly and can only glide through the air, covering wide gaps. Before alighting, they rise upwards in order to make a smooth landing. When not in flight, the elastic parachute is tucked close to the body and can barely be noticed. Flying squirrels are nocturnal forest animals and roost in tree-holes or build large, leaf nests. They live on fruit, nuts, bark, gum, resin, larvae and buds. Their monotonous call can be heard at night. Their breeding habits are not known. Young squirrels do not have fully developed parachutes.

Of the larger flying squirrels that are about 3.5 ft (105 cm) in length, many varieties are found in India. The **Kashmir woolly flying squirrel** (*Eupetaurus cinereus*) is found in northern Kashmir and Sikkim above the tree line and lives on rocks and cliffs. The **common giant flying squirrel** *(Petaurista petaurista)*, light brown on top with a yellow-brown tail, and the **large brown flying squirrel** *(P. petaurista philippensis)* are found in peninsular forests, south of the Ganga. The **red flying squirrel** *(P. petaurista albiventer)*, rich brown in color, with pinkish-buff underparts, occurs in the western Himalaya, north of the Ganga. A maroon-colored squirrel, with a yellow line in the middle, black-tipped tail and reddish underparts, **Hodgson's flying squirrel**, is found in Assam and the eastern Himalaya.

Among the smaller flying squirrels, the **small Travancore flying squirrel** *(Petinomys fuscocapillus)* is the only variety found in the south. The blackish-buff **Kashmir flying squirrel** *(Hylopetes fimbriatus)* lives in the western Himalaya, near the tree line. The **particolored flying squirrel** *(Hylopetes alboniger)*, blackish with white underparts occurs in the eastern Himalaya and Assam, together with the **hairy-footed flying squirrel** *(Belomys pearsoni)* recognized by clumps of brown hair near its ears.

Giant squirrels: These live only on the tops of very tall trees and rarely come to the ground. They leap from one tree to another across gaps up to 20 ft (6 meters) wide. They are very agile and active and can be seen stretched across high branches. They have loud rattling calls and raise a warning alarm when any alien creature is sighted. They live alone or in pairs and build their nests on very slim branches, safe from predators. When the trees lose their leaves, these nests can be clearly seen. Their breeding habits are not known.

The **Indian giant squirrel** *(Ratufa indica)* is found in both deciduous and evergreen forests. It occurs mainly in peninsular India, south of the Ganga. The **grizzled giant squirrel** *(Ratufa macroura)* occurs in South India and Sri Lanka. Its back and tail are brownish-gray in color. The

Left, a long-eared hedgehog and above, the black-naped hare.

Malayan giant squirrel *(Ratufa bicolor)* has a dark black-brown coat and is buff underneath. It is found in Nepal, Sikkim, Bhutan, Assam, Burma and Malaysia.

Himalayan squirrels: The **orange-bellied Himalayan squirrel** *(Dremomys lokriah)* is dark reddish-brown, touched with yellow. The fur on its back is grayish-brown, the longer hairs forming a single yellow ring. The lower parts are orange. This species has a pointed snout and lives in forested areas above 5,000 ft (1,525 meters). Though arboreal, it finds its food on the ground, a favorite being fallen fruit.

The **hoary-bellied Himalayan squirrel** *(Callosciurus pygerythrus)* is gray for the most part, with a reddish belly, the longer hairs forming two light rings. It lives in dense forests in Nepal, Sikkim, Bhutan and Assam. It makes a grass nest high up in the trees and raids orange groves.

Striped squirrels: The **five-striped palm squirrel** *(Funambulus pennanti)* is a small species with three dark longitudinal stripes on its back and two pale ones on the flanks. It is found all over the subcontinent, south of the Himalaya, and often lives around human habitations. It is active and scampers up and down all the time.

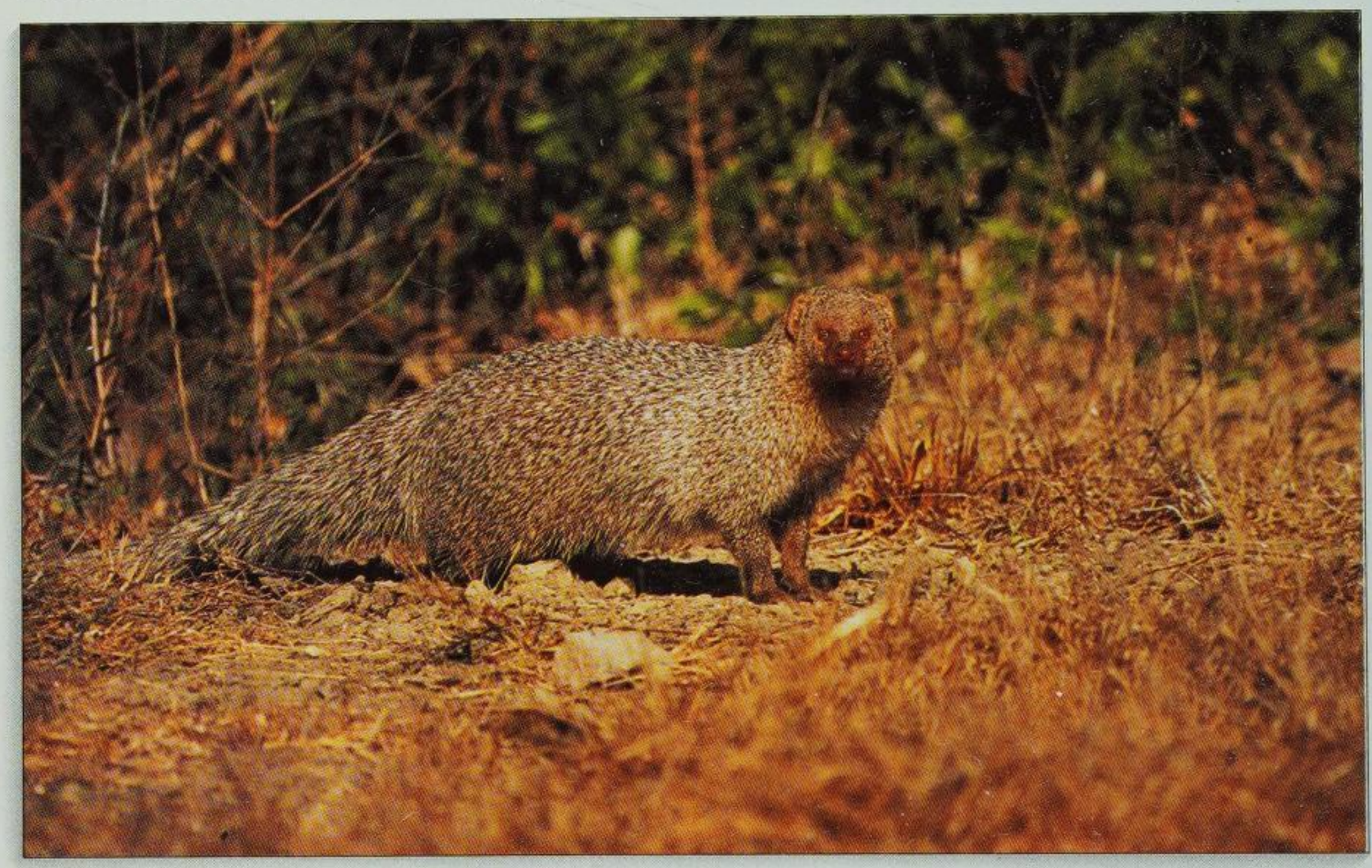
The **three-striped palm squirrel** *(Funambulus palmarum)* has three stripes on its back and ocurrs commonly in the damp forests of western and eastern India and also in the south. Unlike the five-striped squirrel, it is an animal of the forest, where its shrill call can be heard repeatedly.

The **dusky-striped squirrel** *(funambulus sublineatus)* has a speckled greenish-gray coat and four longitudinal stripes on its back. It is small and shy and is found in the dense forests of southern India.

The **Himalayan-striped squirrel** *(Callosciurus macclellandi)* is small and has a grayish-brown coat with black, brown and buff lines. It is found in Assam and Burma around heights of 5,000 ft (1,525 meters).

Marmots: Marmots belong to the squirrel family. They live in underground burrows. Stoutly built, they have short tails and very small ears. The **Himalayan Marmot** *(Marmota bobak)* has a pale, tawny color. Its face and the end of its tail are dark brown. The **long-tailed marmot** *(Marmota caudata)* is of a handsome rich, reddish-brown color with a black back and a very long tail.

Marmots are found in the Himalaya, in Nepal, Sikkim, Kashmir, Ladakh and Garhwal at an altitude of 14,000 ft (4,300 meters). They live on roots, leaves, grass and seeds. They are often seen sitting on their haunches, calling out with a loud whistling scream. The young are born in spring and are three to four in number.



Gerbils: Gerbils belong to the rat family. They can be identified by their tails, which end in tassels. Their unusually long hind feet seem to prompt them to leap from place to place. The **Indian gerbil** *(Tatera indica)* is reddish-brown in color, with pale streaks on either side of the tail. It is found all over the peninsula. The **Indian desert gerbil** *(Meriones hurrianae)* is smaller, sandy-yellow colored and occurs in the desert and semi-desert areas of northwest and central India.

Gerbils live on the plains near cultivated fields and eat grain, roots, leaves and grass. The desert variety eat seeds, tubers and nuts. They appear in large numbers and are crop-pests. As many as 19 young are born after a gestation period of a month.

Voles: These, the *Microtinae*, form yet another division in the order *Rodentia*. They are somewhat different from rats in appearance with their short muzzles, round heads, small ears, short tails, and rounded bodies designed for burrowing. Their teeth have special features. The grinders are flat with triangular cuts on the surface, making them specially good for crushing coarse grass and roots. They live in the higher areas of the Himalaya in Kashmir and Ladakh. **Royle's vole** *(Alticola roylei)* is common at a height of 10,000 ft (3,000 meters). They live in rocky areas that abound in coarse grass. They are reddish-brown in color, with pale sides and underparts and a dark tail, and they have protruding ears.

The **Sikkim vole** *(Pitymys sikimensis)* is dark brown and occurs at heights around 12,000 ft (3,700 meters). Old tree stumps and roots are its favorite haunts. It is a forest animal and makes a grass nest.

Bamboo rats: These form a separate family of rodents, the *Rhizomyidae*. They look like moles but have rodent-like projecting incisors. Their cylindrical bodies, mole-like heads, small eyes, short limbs and short tails are their distinguishing features. Digging with their teeth, they live in burrows in open grassy ground. They feed on grass, roots and leaves. When attacked they expose their teeth in anger and bite fiercely. The **bay bamboo rat** *(Cannomys badius)* is a small chestnut-brown rat. It occurs in the lower Himalaya in Nepal, Sikkim, Bhutan and Assam. The **hoary bamboo rat** *(Rhizomys pruinosus)* has a flecked, grizzled, dark-brown coat. It is found in Assam, China and Southeast Asia. Hill peoples eat its meat. There is no information regarding its breeding habits.

The Indian porcupine: Very different from the other families of *Rodentia*, porcupine belong to the family of *Hystricidae*. Hair modified to form long spines is their distinguishing feature. They live in rocky areas, open land, forests, tall grass or near cultivation. Nocturnal in their habits, their sense of smell is very good. They are very intelligent and cannot easily be trapped or poisoned. Vegetables, grass and roots form their chief food, and they can destroy gardens by burrowing. To balance their diet with a regular intake of calcium, they gnaw and scrape bones and horns. This is proved by the pieces of bone strewn around the entrances of their burrows.

Six to twelve-inch (15–30 cm) bristles grow from the neck and shoulders of the porcupine. Its back is closely covered with long, backward-slanting-quills, ringed with black and white. There is an inner layer of shorter quills. However, the strong, short, white quills at the back are its most dangerous weapons. The hollow white quills near the tail produce the warning rattling sounds.

When attacked or irritated they puff them-

Left, a common mongoose and above, a pair of ruddy mongooses.

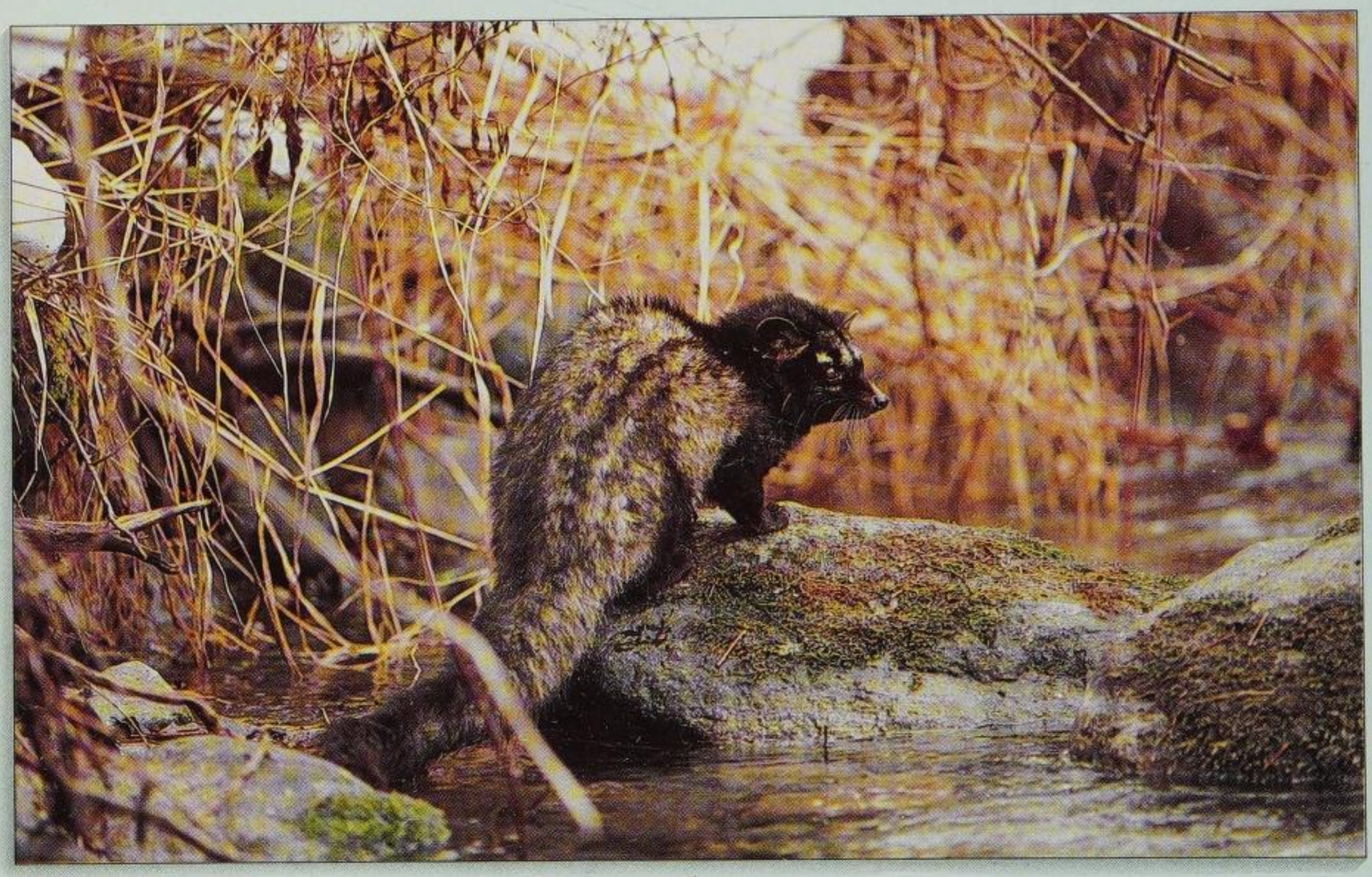
selves up by erecting their spines, they fume and grunt and rattle their hollow back-quills. It is mistakenly believed that porcupines shoot their quills. In fact, they back into their adversaries and suddenly lunge forward, leaving their enemies looking like pin-cushions. These quills enter the bodies of the animals attacked, and sometimes fatally damage the organs of even large animals like tigers and leopards.

The Indian porcupine *(Hystrix indica)* is found all over India from the Himalaya to Cape Comorin and in Sri Lanka. In the hill ranges of South India, the color varies to a rich reddish-brown and there the animal is known as the **red porcupine**. **Hodgson's porcupine** *(Hystrix hodgsoni)*, which occurs in Assam and Bengal at heights of 5,000 ft (1,525 meters) has a very small crest. Another variety, the **brush-tailed porcupine** *(Atherurus*

tongue protrudes and is suddenly drawn back, covered with insects. Rhythmic movements of the throat sieve the debris, acting as a filter.

The pangolin's body is designed to meet specific needs and the legs are perfectly built for digging. They are curved; the forefeet are longer and have blunt claws. The pangolin lives in deep burrows under the ground.

A strong sense of smell guides the animal. Its sight and hearing are poor. Its prehensile tail helps to make the pangolin a good climber. The strong tail is also used in self defense. When moving, the back is arched and the tail held above the ground. Often, the animal stands on its hind feet to get a better view of the surroundings. When attacked, the animal rolls itself into a tight ball showing great muscular power and is almost impregnable. The only sound it emits is a strong hiss, when



macrourus), is said to dwell in lower Bengal, Assam and further east up to Malaysia. It has a long tail with a tuft of bristles and is rather rare.

Pangolin: This scaly anteater is a quaint old-world animal, a survivor from past ages. A series of strong overlapping, brownish-gray scales, a form of modified hair, cover the upper part and sides of the body and the long tail. This covering is said to be bullet-proof. The underparts are covered with coarse bristle-like hair.

Living on an exclusive diet of ants and termites, the pangolin has no teeth. However, its tongue is glutinous, attracting ants that stick on to it. It is long and can protrude 10 inches. Its tongue is linked to the stomach and is controlled by muscles attached to the pelvis. With quick movements, the

alarmed or disturbed. Usually one young is produced at a time and the baby is carried by the mother on her back and tail.

Two species are found in India: the **Chinese pangolin** *(Manis pentadactyla)*, which occurs in the northeast, and the **Indian pangolin** *(Manis crassicaudata)* found in peninsular India. It is hunted for its flesh and for its scales, which are said to have medicinal and magical powers.

Hares and mouse hares: Hares and rabbits of the family *Leporidae*, and mouse hares of the *Ochotonidae* family are distinguished from rodents, by the fact that they have four incisors in the upper jaw, unlike the rodents which have only two. The shape of the skull is also different. Hares have long ears, long hind legs and are born in

burrows, with closed eyes and almost naked skin. Both hares and rabbits have short tails. Mouse hares are small and have no tails. They have rounded ears and short front legs.

There are three important varieties of Indian hare. The **black-naped hare** *(Lepus nigricollis nigricollis)* is a large, heavy variety, with a dark, blackish-brown patch on the back of its neck, up to the shoulder. The upper part of its tail is also black. It is found in most parts of the peninsula.

In the **rufous-tailed hare** *(Lepus nigricollis ruficaudatus)* the nape-patch is gray, while the body and tail are a rich reddish-brown. Black patches are found on the back and face. The underparts are white. This variety occurs from the south of the Himalaya to the river Godavari.

The **desert hare** *(Lepus nigricollis dayanus)* is sandy-yellow in color and has no nape-patch. The upper part of its tail is a blackish-brown. It is found around the desert in Sind (Pakistan), Punjab, Rajasthan and Kutch.

Hares live in bush, jungle and near cultivated land on the outskirts of villages. They are nocturnal and can be seen singly scampering across roads and fields at night. Grass and vegetable matter are their main diet. One or two young are produced during the colder months. Leopards, jackals, wild dogs, mongooses, owls and crested hawks prey on them. People hunt them for their meat and fur.

The **Himalayan mouse hare** *(Ochotona roylei)* looks like a guinea pig. It is small and has a round head, round ears, short muzzle and no tail. It is reddish-brown in color and has a band on the upper neck. It has a shining coat of short, straight hair. It is found right across the Himalaya between 11,000 and 14,000 ft (3,350 and 4,300 meters). In the eastern Himalaya it is found at lower levels. It is commonly seen in rocky areas above the tree line, among coarse grass or under trees. It lives in a burrow. Both timid and inquisitive, its behavior is interesting. It races across the ground playing hide and seek with any intruder. Not much is known of its breeding habits or whether it hibernates.

The true rabbit does not exist in India. The nearest to it is the **Assam rabbit** or the **hispid hare** *(Caprolagus hispidus)*, which is the same size as a hare but has a shorter, dark-brown tail.

Left, common palm civet and above, smooth Indian otters.

This animal has a coarse fur of dark-brown bristles that becomes paler below. The outer side of the ears is brown, the eyes small, the hind legs short and stout, the claws long and the teeth large. Bark and roots are its main food. Seen in the *terai*, *dooars* and Himalayan foothills, it is very elusive and therefore very little is known about it.

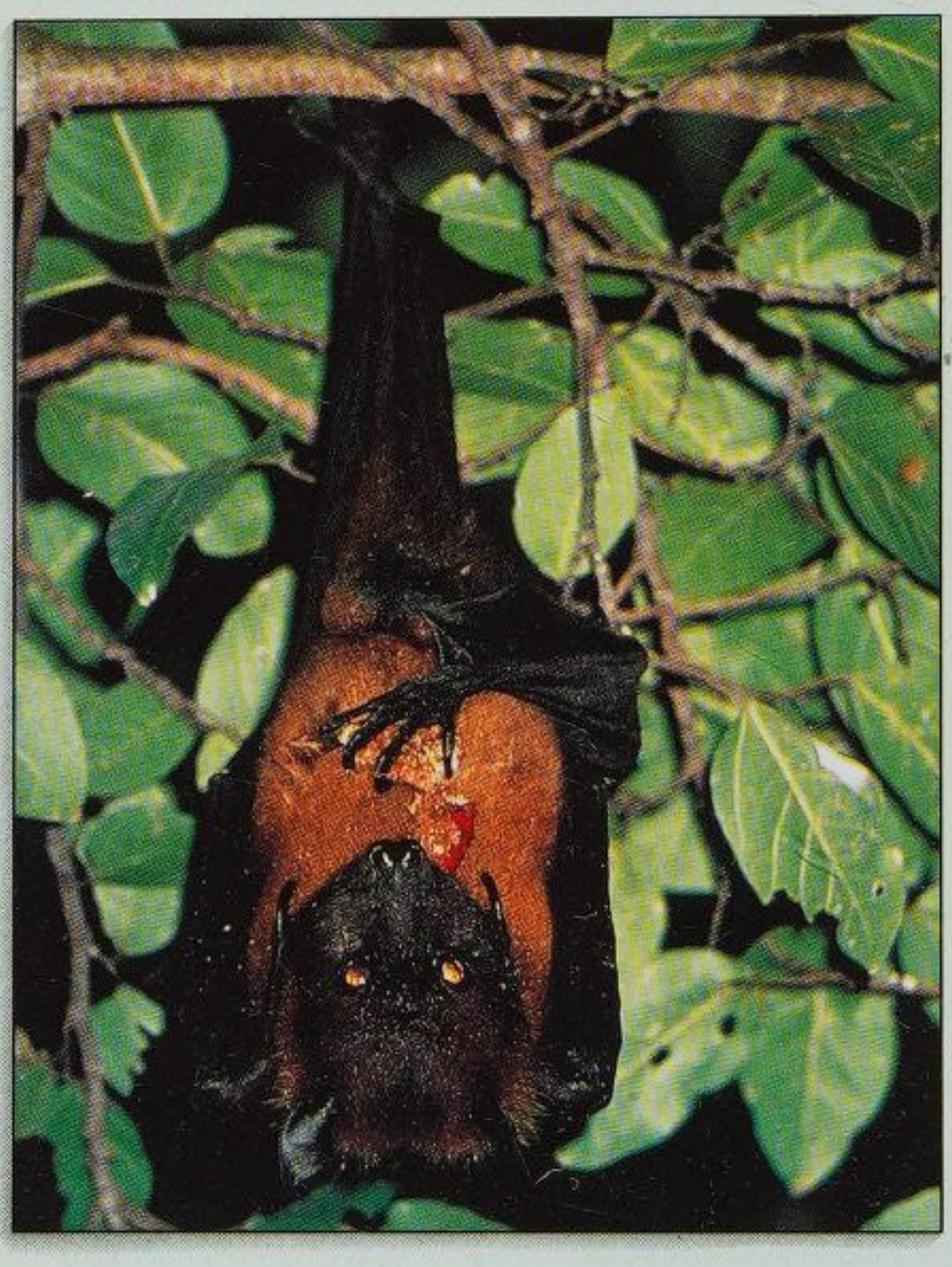
Bats: There is no mammal that can fly in the real sense of the term except the family of bats, *Chiroptera.* Their flight is sustained, unlike that of the so-called flying squirrel, which really only leaps and glides. The oldest bats, found in the form of fossils, must also have had this ability to fly as they have proper wings.

Bats can be divided into two distinct categories: the larger, fruit-eating bats *(Megachiroptera)*

and the insectivorous bats *(Microchiroptera)*, which are generally smaller.

The very name, *chiroptera*, derived from Greek, means hand-wing. Bat's wings are attached to their forearms. From the wings, membranes extend to the feet and spread between the legs, enclosing the tail. An additional membrane joins the neck to the forearms. Thus, an unbroken, complete parachute is formed. Bats have strong hearts and lungs. Powerful flying muscles make them strong fliers. The tail, which curves towards the belly, acts as a brake.

Fruit bats have excellent grinding teeth. The molars are oblong and have smooth crowns divided by a deep long groove. The food is ground to a pulp and the juice goes directly into the gullet through their grooves. Fruit bats feed in the early evening and have good eyesight.



Insectivorous bats have teeth that serve a different purpose. They have molars with sharp, pointed cusps in the crown, forming a W shape. These are perfect for holding and piercing. Vampire bats are known to drink blood. They have front teeth designed for piercing. Insectivorous bats feed at night and manage to fly with the help of a highly developed echo-apparatus, similar to a sonar system. They have very strong voice-boxes and muscles and can produce shrill signals at a rate of 50 pulses per second. When these sound vibrations strike an object, they are reflected back and picked up by the bat. This helps bats to avoid colliding with objects. In cold weather, bats hibernate.

The **flying fox** *(Pteropus giganteus)* is the largest Indian bat. Its wings spread across 4 ft (120 cm). It has a reddish brown head with a black snout and black wings. Its neck, shoulders, chin and flanks are varied hues of brown. It is seen all over the subcontinent except in arid areas like West Rajasthan and the higher reaches of the hills. Flying foxes roost together on trees in noisy groups and fly to far-off orchards in search of fruit. They breed once a year, after a gestation period of five months.

The **fulvous fruit-bat** *(Rousettus leschenaulti)* is medium sized and light-brown in color. It has a strong smell of fermented fruit juice. Common in the Indian peninsula, large colonies roost in caves and in ruins and fly out looking for fruit at dusk. They breed twice a year. The young are carried by the mother for two months.

The **short-nosed fruit-bat** *(Cynopterus sphinx)* is large and brown and is recognized by its divergent nostrils and white-margined ears. Found in peninsular India, it roosts among palm leaves and aerial roots of the banyan and eats fruit and sips honey from flowers. Its breeding habits are not exactly known, although young are seen carried by their mother in September.

The medium-size sandy-gray, **bearded sheath-tailed bat** *(Taphozous melanopogon)* has a beard that is drenched during the rainy season with a thick fluid produced by the chin glands. Colonies of over 4,000 are found in ruins and cave temples, clinging to walls. They fly out before dusk and feed on insects. Found in peninsular India, the young are born in April-May and separated from the mother permanently after a month.

Another species, the **Indian false vampire** *(Megaderma lyra)* is dark gray in color. The nose-leaf seems truncated. Groups of around 30 live together in wells or caves and feed on rats, small birds, geckos and frogs. The young are born in April and are carried by the mother till almost full-grown.

The **great eastern horseshoe bat** *(Rhinolophus luctus)* has long, woolly, curly fur that is jet black with ashy-gray tips. It has large ears and a horse-shoe-shaped nose-leaf covering the upper lip and cut in the middle. Found in the Himalaya, Western Ghats and Sri Lanka, it occurs in pairs, but is seldom seen. Little is known of its breeding habits.

The **Indian pipistrelle** *(Pipistrellus coromandra)* is small in size, with dark fur above and pale hair underneath, with dense fur between its eyes. A fast flier, it is busy all through the night. It lives in the eaves of houses and enters them while seeking out insects. Its breeding habits are not yet known. Two young are usually observed in May.

Left, flying-fox eating wild figs and right, short-nosed fruit bat.

REPTILES

Reptiles are a well-represented and diverse group of animals in this region, with over 400 species of snakes, lizards, turtles and crocodilians in India alone. Contrary to popular belief, it is not only in forested areas that one comes across reptiles; most of the larger, rodent-eating snakes and lizards are prevalent in open, cultivated areas, which have an abundance of rats and fresh water. In fact this is probably the only animal group that has benefited somewhat from the large-scale conversion of forestland to farmland over the past 60 years. Thus, travelling along country roads bordered by fields, one often sees a monitor lizard *(Varanus bengalensis)* running across the road or a large rat snake *(Ptyas mucosus)* hunting along a bund between fields.

Reptiles play a significant role in Hindu religion and mythology and several of the major deities are associated with snakes. But while people worship snakes, they also fear them, and snakes are usually killed on sight; even the harmless species are not spared, as all snakes are generally considered venomous.

Consumer exploitation has been high in this animal group. Before it was banned in 1976, the skin trade tanned 10 million snake skins a year, and several species such as the **rock python** *(Python molurus)* became locally extinct in many areas. The illegal skin market nevertheless continuous to flourish.

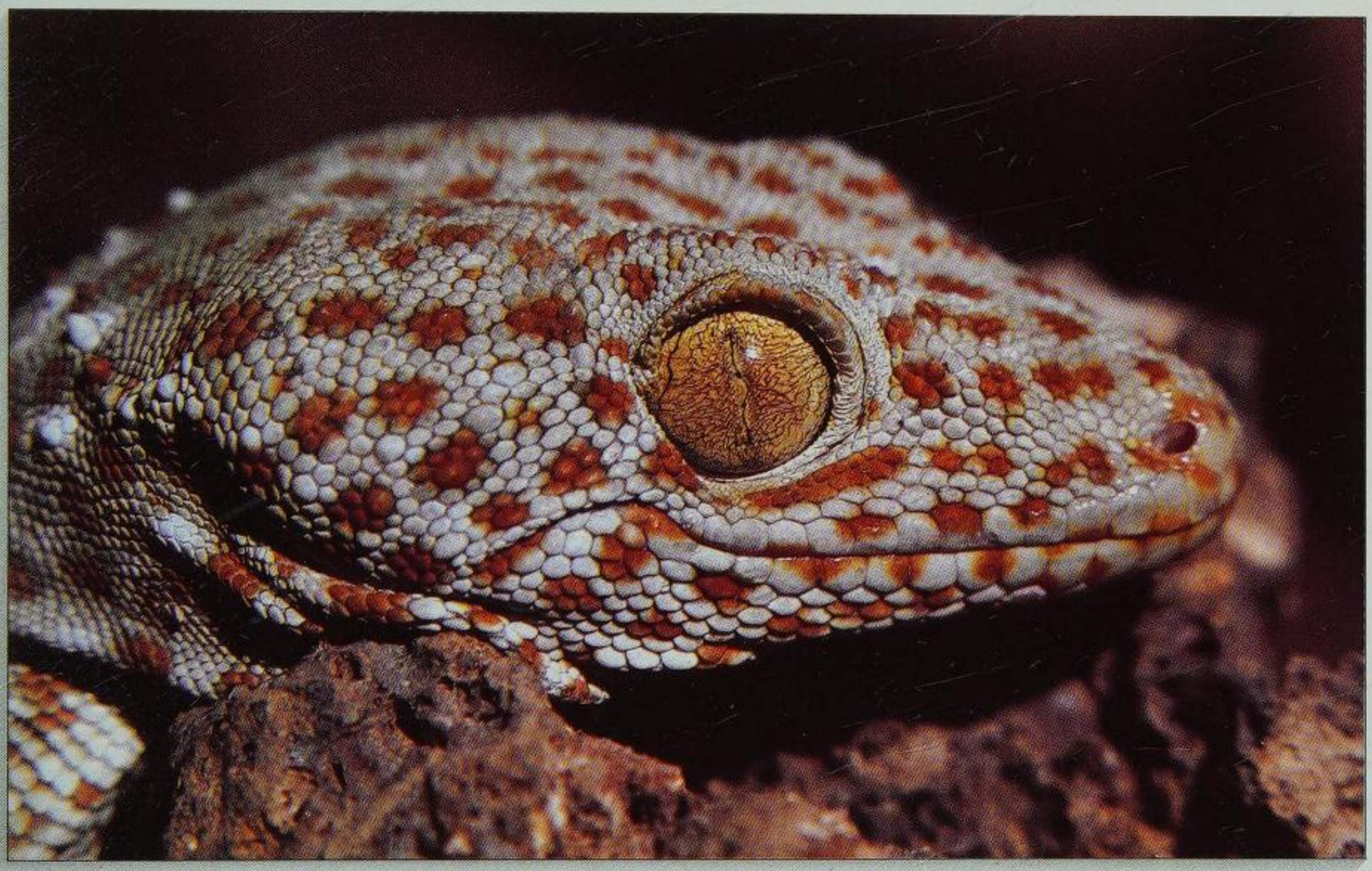
Snakes: There are 238 species of snakes in India, ranging from the giant **reticulated python** *(Python reticulatus)*, which grows to 30 ft (10 meters), to the tiny **worm snake** *(Typhlina bramina)*, which achieves just over 4 inches (10 cm), and is often mistaken for a worm. Snakes inhabit a wide range of environments, from paddy fields and open sandy areas to thick rainforests, mangrove swamps, mountains up to 15,000 ft (4,500 meters), and even the open sea. Their food varies considerably, depending on the size of the snake and prey availability. Frogs and rodents are perhaps the most generally acceptable items for the open-country species, but there are interesting exceptions. The **king cobra** *(Ophiophagus hannah)*, the largest venomous snake in the world, which grows to 16 ft (5 meters) in India, are "ophiophagus"; that is, they eat only snakes, mostly the ubiquitous rat snake. Sea snakes eat fish, and small burrowers like the fascinating group of shield-tails or uropeltids eat insect larvae and worms.

Some snakes lay eggs; other have living young. Several species of egg layers such as pythons, cobras *(Naja naja)* and water snakes have been found to stay with the eggs until hatching. The king cobra is the only snake in the world that builds a nest: the female, incredibly, scrapes leaves and humus into an 18-inch (46-cm) high mound in which she lays her eggs.

Right from the egg stage through to adulthood, most snakes have a variety of natural enemies. Many have startling defense stances, the most well known of which is the dramatic hood display of the cobra, which inflates its body and expands its rib cage to spread a "hood" to intimidate enemies. Others exhale breath forcefully, and "hiss." The **saw-scaled viper** *(Echis carinatus)* produces this sound by rubbing its rough scales together.

Venomous snakes: Although there are more than 50 species of venomous snakes in this region, the majority, for various reasons, pose no threat to humans. The king cobra, for example, lives in dense evergreen forests, which people do not usually venture into; nor is the king cobra given to unprovoked attacks as is commonly believed. The 20 species of sea snakes that inhabit the coastal waters are timid, shy animals that won't bite unless restrained or injured, and the same is true of the banded krait. Other species such as the pit viper usually have only a mild venom, which is adequate to kill small prey like frogs and lizards, but which causes only pain and swelling in larger animals like adult humans.

The Big Four to watch out for are the cobra, krait *(Bungarus caeruleus)*, Russel's viper *(Vipera russelli)* and the saw-scaled viper. Together, they cause 10,000 snakebite deaths every year in India alone. It is important to learn to recognize these four, and to remember that antivenom serum, available at large hospitals, is the only cure for their bite. Each of these snakes is fairly easily distinguishable, though it is easy to confuse them with other harmless species. The **cobra** varies in color from cream to black; generally, it is brown. The hood may not have the typical speckled or monocle marking. **Russel's vipers** are heavy-bodied snakes with narrow necks, triangular heads and a regular chain-like pattern on the back. The scales are very rough and the overall color is yellowish and brown. **Kraits** are blue-black and shiny with transverse thin white cross bands, which may be very faint or even absent. The saw-scaled viper is the smallest of the Big Four, growing to just a foot in South India; it is brownish with white markings and has the triangular head typical of the vipers. In some areas, this viper is amazingly abundant, such as in Ratnagiri District in Maharashtra.



Left, the harmless and beautiful golden tree or flying snake, common in Sri Lanka but rarely seen in India, Above, Tucktoo gecko, common in northeastern India.

Harmless snakes: There are several species of non-venomous "garden snakes" common throughout the region. The large **rat snake** is often mistaken for a cobra, but has a more pointed head, large eyes and of course does not spread a hood. The bright green **vine snake** *(Ahaetulla nasuta)*, with its pointed head and elliptical eye pupils is the target of many derogatory myths. In Tamil Nadu it is known as the *kunn kuthi pambu*, eye-pecking snake. The **bronze-back tree snake** *(Dendrelaphis tristis)* is very fast, thin and chocolate-brown with a light-bronze stripe down its back. It, too, is widely feared and stories abound

about its evil characteristics. Other groups of harmless snakes include the **kukri snakes** *(Oligodon)*, **wolf snakes** *(Lycodon)*, **trinkets** *(Elaphe)*, **racers, cat snakes** *(Boiga)* and freshwater snakes. There are several interesting burrowers, like the stubby **sand boas** *(Eryx)*, the **worm snake** and the **shield-tail.**

The most productive places to see the common species of snakes are in agricultural areas and bordering bushes and thickets. Just before sundown is a good time, since this is when cobras, rat snakes and others hunt for rats and frogs. But the excellent camouflage of these reptiles plus the heavy hunting pressure for skins, which has made them wary and timid, makes it difficult to spot them. As opposed to temperate areas where snakes are often diurnal and live in accessible places, here most species tend to be nocturnal and live in

secure rat holes, termite mounds and other cool refuges.

In some parts of the region there are specialized groups of people who hunt snakes (traditionally for the skin trade) and they are the best guides. The Irulas of Tamil Nadu are probably the best snake hunters in the world and the Irula Cooperative in Chennai can be contacted for a day's snake hunt around Chennai. From a faint, barely visible scrape on the ground, an Irula can tell the species and size of the snake, which way it went and how long ago.

Places of interest: Unlike mammals, there are few places where one can be sure of seeing a particular snake. One exception seems to be the Keoladeo Ghana (Bharatpur) Bird Sanctuary where in the winter months one can almost always see big rock phythons basking on low branches or in front of the burrows they live in. The tourist's first encounter with a snake in India is usually through the snake charmer, who travels around the country with his sick, de-fanged cobras and makes them "dance" to his flute. In truth, snakes hear practically no air-borne sounds and the cobra's swaying dance is a defensive movement with which the snake warily watches the flute and the "charmer," potential enemies of which it is terrified.

The Irula Cooperative is a venom-production center where tourists can see the Big Four venomous snakes and the extraction of venom. It is run by the Irula hunter-gatherer Adivasis. Members catch and supply the Big Four snakes to the Cooperative, where they are kept for three weeks and the venom extracted thrice. The snakes are then released back into the wild. There are snakes on display at the Chennai Snake Park, Kolkata Snake Park, Pune Serpentarium and Sundervan in Ahmadabad.

There are several festivals and ceremonies associated with snakes. The most dramatic is the August *nag panchmi* harvest festival of Battis Shirala near Sangli, Maharashtra. Wild cobras are caught by the local farmers and laborers and worshiped for the few days of the festival. Then they are released into the fields, unharmed. In the evenings during the festival, one can see large numbers of cobras lined up, hoods spread, in front of the temporary snake charmers, as women step up to propitiate them with flowers, ghee and *kum*

kum powder. In West Bengal, the Jhampan festival, which takes place in July–August, is conducted by *Jhampanias*, priests who are the gurus of snake charmers. They arrive at the ceremony in colorfully decorated carriages *(jhampans)* with baskets containing king cobras, cobras, vipers, kraits, rat snakes and other species. Snake charming, traditional singing and other festivities take place.

Lizards: There are over 150 species of lizard in the subcontinent. The majority are forest dwellers and consequently difficult to sight. The most commonly seen are a few species of **geckos** *(Hemidactylus)*, which quickly colonize houses, darting about on the ceiling in the evening, seeking out cockroaches, mosquitoes and other prey. In spite of this free pest-control service, geckos are unpopular animals overall; people mistakenly believe they are poisonous, and that a gecko falling into food can cause fatal poisoning.

The social behavior of geckos is fascinating, with a very definite pecking order and ferocious territorialism between males. Their main predators are "house snakes" like the wolf snake and cat snake as well as false vampire bats.

Another widely distributed group of lizards is the *agamids*, and of these the **garden lizard** *(Calotes versicolor)*, unfortunately called the bloodsucker, is the most common. The male in breeding color is an impressive creature, with his handsome, sharp crest, orange head and colorful dewlap or throat flap, which is expanded during territorial displays. The **Sita's lizard** *(Sitana ponticeriana)* is a four-inch long colorful agamid with a bright blue throat fan. It is capable of great bursts of speed, sometimes streaking along on its hind legs like the South American basilisk. **Skinks**, the smooth, crestless lizards, often mistaken for snakes, are another widely distributed group, and range in length from 3–12 inches (8–30 cm). The young of several of these skinks have brilliant, almost electric tails, usually bright blue or orange.

There is one species of **chameleon** *(Chameleo zeylanicus)* found throughout India and Sri Lanka, but its capacity for camouflage makes it almost impossible to spot. Their large, independently moving eyes help them to avoid enemies and find their insect prey. The long, flexible tongue, almost 1 foot (30 cm) long, is shot out with amazing speed to catch a passing butterfly or termite.

Left, mugger or marsh crocodile and above, sea turtles hatching.

The largest, most conspicuous lizards of this region are the *varanids* or **monitors** of which there are four species. The **water monitor** *(Varanus salvator)* grows to over 6 ft (2 meters) and is the most colorful, with black and yellow markings. Where unmolested they become very tame; on the outskirts of Colombo, they can be seen scavenging around rubbish dumps or hanging about markets in expectation of scraps. In India they are found in the Andaman and Nicobar Islands, the Sunderbans delta in West Bengal and at Bhitar Kanika in Orissa, the only places that still have mangrove forests. The **Bengal monitor**, a uniform or speckled brown, is a 3-foot (91-cm) long lizard common throughout India, Sri Lanka and Nepal that frequents open cultivated areas as

well as wooded and forested tracts. The **yellow monitor** *(Varanus flavescens)* is a brightly marked monitor, smaller than the Bengal monitor and with a stubby head. It is found only in parts of the north such as the states of Bihar, Uttar Pradesh and West Bengal. A similar looking lizard, the **desert** or **Agra monitor** *(Varanus griseus)* is confined to the northwest, notably the Rajasthan desert.

Lizards of this region are unique in many ways. Over 75 species of Indian lizards are endemic, that is they are found in very limited geographical ranges, many in evergreen forests such as those of the Western Ghats. Of these several are known only from a few museum specimens and the natural history of most is largely unstudied. One of the most dramatic looking of the endemic lizards is the dragon-like creature, *Lyriocephalus*, of the Sinharaja forest in southern Sri Lanka, with its strange knob on the head and startling colors. Another, *Cophotes*, is one of the viviparous lizards in the region.

Turtles and tortoises: Generally, turtles live, feed and breed mostly in water, and tortoises mainly on land; but, as is often the case, there are notable exceptions. There are 26 species of freshwater turtles and tortoises in India, and five species of marine turtles, which feed in coastal waters and lay their eggs on suitable beaches. Of the freshwater turtles, the most abundant are the **flap-shell turtle** *(Lissemys punctata)* and the **black pond turtle** *(Melanochelys trijuga)*, both of which are widely eaten. In West Bengal especially, thousands are slaughtered every week, in spite of protective legislation. Among the tortoises, the most widespread is the **star tortoise** *(Geochelone elegans)* conspicuous by its black and yellow markings. Its typical habitat is open scrub forest in the dry southeast and northwestern parts of the country. Large numbers are killed in the south for the shell, which is made into souvenirs for the tourist trade.

Of the five species of marine turtles in this region, four nest on Indian beaches and during the two-month nesting season it is possible to witness the whole egg-laying sequence, since once the female begins her task of procreation she is oblivious to the close presence of humans. In Tamil Nadu, the **olive ridley** *(Lepidochelys olivacea)* nests from November to February and the World Wildlife Fund office in Chennai conducts regular "turtle walks" at night to see this phenomenon and

to collect nests for safe incubation; otherwise they usually end up at the local market. But the real turtle-nesting extravaganza takes place in February–March at the Gahirmatha beach in Bhitar Kanika Sanctuary, Orissa, where over 200,000 ridleys come to nest in the space of three or four nights.

Places of interest: The Crocodile Bank just outside Chennai has a freshwater turtle breeding program and several species can be seen there. Turtles are kept and fed, in some cases during rituals, at several shrines in India such as at Dakor, 35 miles (56 km) from Ahmadabad (Gujarat). At the right time of year, walking along known nesting beaches at night can be a very rewarding experience. In Sri Lanka, the giant **leatherback**

turtles *(Dermochelys coriacea)*, which grow to 6 ft (1.8 meters), nest on the southern coast and the Wildlife and Nature Protection Society of Sri Lanka has a yearly hatchery where eggs are buried and the young released into the sea on hatching. At Kosgoda in Sri Lanka, four species of sea turtle nest most of the year. One of them is the **loggerhead** *(Caretta caretta)*, which has not been seen on Indian beaches.

Crocodilians: Perhaps the most unusual of the world's crocodilians, the long-snouted, fish-eating **gharial** *(Gavialis gangeticus)*, is found in India and Nepal and inhabits the large, fast-flowing rivers (Ganga, Mahanadi, Brahmaputra and their tributaries). By the mid-1970s, the gharial had been rendered almost extinct due to heavy hunting pressure for its valuable skin and from loss of habitat due to the damming of rivers. But thanks to timely conservation efforts – wild-egg collection and captive rearing – there are now over 2,000 gharial in captivity and over 1,200 have been released into the wild. Gharial are very unusual-looking creatures with big bulging eyes, long narrow jaws studded with razor-sharp teeth and the big pot-like growth at the end of the snout, which the adult male sports. They feed almost exclusively on fish.

The other two species of crocodiles in this region are the **mugger** or **marsh crocodile** *(Crocodylus palustris)* and the **saltwater crocodile** *(Crocodylus porosus)*. Both are found in India and Sri Lanka; the mugger, like the gharial, is found in Nepal as well. The saltwater crocodile has earned an unenviable reputation because some of the big ones occasionally take cattle, goats or even a human to vary its diet; there are areas along rivers in Sri Lanka where villagers construct safe, fenced-in bathing areas to protect themselves from the whims of the "salty." In India, "salties" are found in the Andaman and Nicobar Islands, Bhitar Kanika in Orissa and the Sunderbans in West Bengal. Mugger are extremely adaptable and live in any freshwater (sometimes even brackish water) habitats, from large reservoirs to small streams. During extreme dry months or drought they make deep tunnels or even trek miles overland throughout India but, again because of hunting pressure, are now confined to a few protected reservoirs and rivers. Mugger breed well in captivity and the Government Crocodile Project has over 5,000.

Left, tree frogs ensuring the continuance of their species and above, monitor lizard.

Places of interest: The three Indian species, plus others such as **Siamese crocodiles** and **African dwarf crocodiles**, can be seen at the Chennai Crocodile Bank which has over 2,000 crocodilians. In the wild, gharial can be seen at the Chitwan National Park in Nepal, and the Corbett National Park in Uttar Pradesh; saltwater crocodile at Bhitar Kanika, Orissa; and mugger at Hiran Lake, Gir Sanctuary (Gujarat), and Ranthambhore National Park (Rajasthan), where one or two can often be seen basking on the banks. At Panama Wewa near Arugam Bay in Sri Lanka, wild mugger are numerous and can be seen by the score basking, feeding and socializing.

BIRDS, RESIDENT AND MIGRANT

The distribution of birds over the globe is a fascinating subject, and the reason why some species are so widespread and others so restricted is largely a matter of speculation. The changing physical pattern of the world over geological periods has much to do with the presence or absence of birds in various parts of the world. A striking example of discontinuous distribution, as a result of geological changes, is provided by the existence of laughing thrushes and spider hunters in northeastern India in the Himalaya, and then again, after a gap of 2,000 miles, in the Western Ghats in southwest India. It is presumed that at one time there was a continuous Satpura range of mountains joining these two areas and these species then were presumably linked. With the disappearance of the mountains under geological forces acting through the Deccan Plateau only a relict population of these species remain in two distant parts of the country.

But ornithologists wonder how some land birds manage to colonize areas across the oceans, far away from their original home, like some on Tristan Da Cunha 2,000 miles away from land, while some, which have proliferated all over the United States, have been unable to reach even the West Indies. The same is the case with Sri Lanka. Though most Indian species have no difficulty in crossing the short sea barrier (even poor fliers and essentially land birds like the paradise flycatcher going over), it is a curious fact that no vulture has crossed the negligible sea barrier and, consequently, there are none beyond the southern tip of India. Only one or two **scavenger vultures** *(Neophron percnopterus)* have been seen in Sri Lanka, and the fact that these birds are strong fliers, seen everywhere in South India, makes their absence across Palk Strait inexplicable.

Sri Lanka has approximately 397 species and subspecies and 358 forms are almost identical with those of India. Largely for geological reasons there are several endemic species of birds found only in the southernmost hilly areas of the island. Among these are the **green-billed coucal**, **Ceylon blue magpie**, **yellow-fronted barbet** and **Legg's flowerpecker**. It is also noteworthy that a special race of the **paradise flycatcher** *(Tchitrea paradisi)* has evolved in island isolation in Sri Lanka. Unlike the Indian form this bird has no white phase.

At the other end of India, Nepal, an exceptionally beautiful country, has a splendid assortment of colorful birds, some like the **Himalayan snow-cock** *(Tetraogallus himalayensis)* and many birds of prey are found even above the tree line. In fact an **eastern steppe eagle** *(Aquila nipalensis)* was found on the South Col of Everest. From its jagged peaks in the north with arctic conditions, to moist lowland forests in the south, there are as many as 800 species of birds as compared to the 1,200 of India. Many species are of course common to both countries, and because of its geographical position the birds of Nepal have strong affinities with those of the palaearctic region. But it has only one truly endemic species, the **spiny babbler** *(Turdoides nipalensis)* as against the 10 in India.

As a result of the drastic changes in India's environment in the course of the past six decades – particularly as a result of the cutting down of forests and extending the range of grasslands and agricultural areas, there has been a corresponding change in the pattern of the avifauna throughout the country. Woodpeckers, for example, have been drastically reduced and seed-eating birds, finches and larks, have multiplied.

Zoogeographically speaking, the world is divided into the Palaearctic, Nearctic, Neotropical, Ethiopian, Asian and Australian regions. India's avifauna has strong links with the African as well as with the birds of the Indo-Chinese region. Only a few have palaearctic affinities. But there are several species that are endemic to India, i.e. they are not found anywhere else in the world, and a few of these might be mentioned. The **chir pheasant** *(Catreus wallichii)*, larger than a village hen and "reminiscent of an English hen pheasant," is found in West Himalayan conifer and deciduous forests; the **pinkheaded duck** *(Rhodonessa caryophyllacea)*, a rare species even in the 19th century, was last seen in Bihar in 1935 and is probably extinct. Another bird that is feared to have become extinct is the **Himalayan mountain quail** *(Ophrysia superciliosa)*, last recorded in Nainital in UP in 1876.

The **white-winged wood duck** *(Cairina scutulata)*, a resident of the swamp forests of Assam, though not endemic, is on the danger list because of habitat destruction. Sir Peter Scott bred these birds in captivity in Slimbridge in the United Kingdom and some have been reintroduced in Assam.

Not all endemic species in India are rare or extinct. The **Indian robin** *(Saxicoloides fulicata)* for example, slightly larger than a sparrow, a black bird with white on the shoulder, and a rusty red patch under the tail is found "in dry open lightly wooded country" throughout India. The **rufousbellied babbler** *(Dumetia hyperythra)* and

Preceding pages, demoiselle cranes, Gujarat. Left, whiskered terns, Bharatpur, Rajasthan.

the **blackheaded babbler** *(Rhopocichla atriceps)* are also common birds, the range of the former extending from the Himalaya to South India and the latter to the evergreen biotops of the Western Ghats.

One of the most exciting events of the 20th century was the rediscovery of **Jerdons Courser** *(Cursorius bitorquatus)* on January 14, 1986, in Cuddapah in Andhra Pradesh. An attractive bird about the size of a partridge but with longer legs, pinkish-brown with two white bands across the breast. This courser, whose nearest relations are in far-away Africa, was last seen in 1900, and had eluded the keenest observers because it appears to be nocturnal in its habits and was only rediscovered at night in the glare of a motor vehicle's headlights. A sanctuary has been established by the Andhra Pradesh Government in the area where some birds of this species still exist.

Ecologically, India is a rich country, with few vacant niches where exotic species can get a foothold. The **Java sparrow** *(Padda orizivora)* is perhaps the only foreign species that has acquired a breeding status in India; but the fact that it is not spreading significantly is fortunate because the problems caused by exotics – their displacement of the local avifauna for example – are well known.

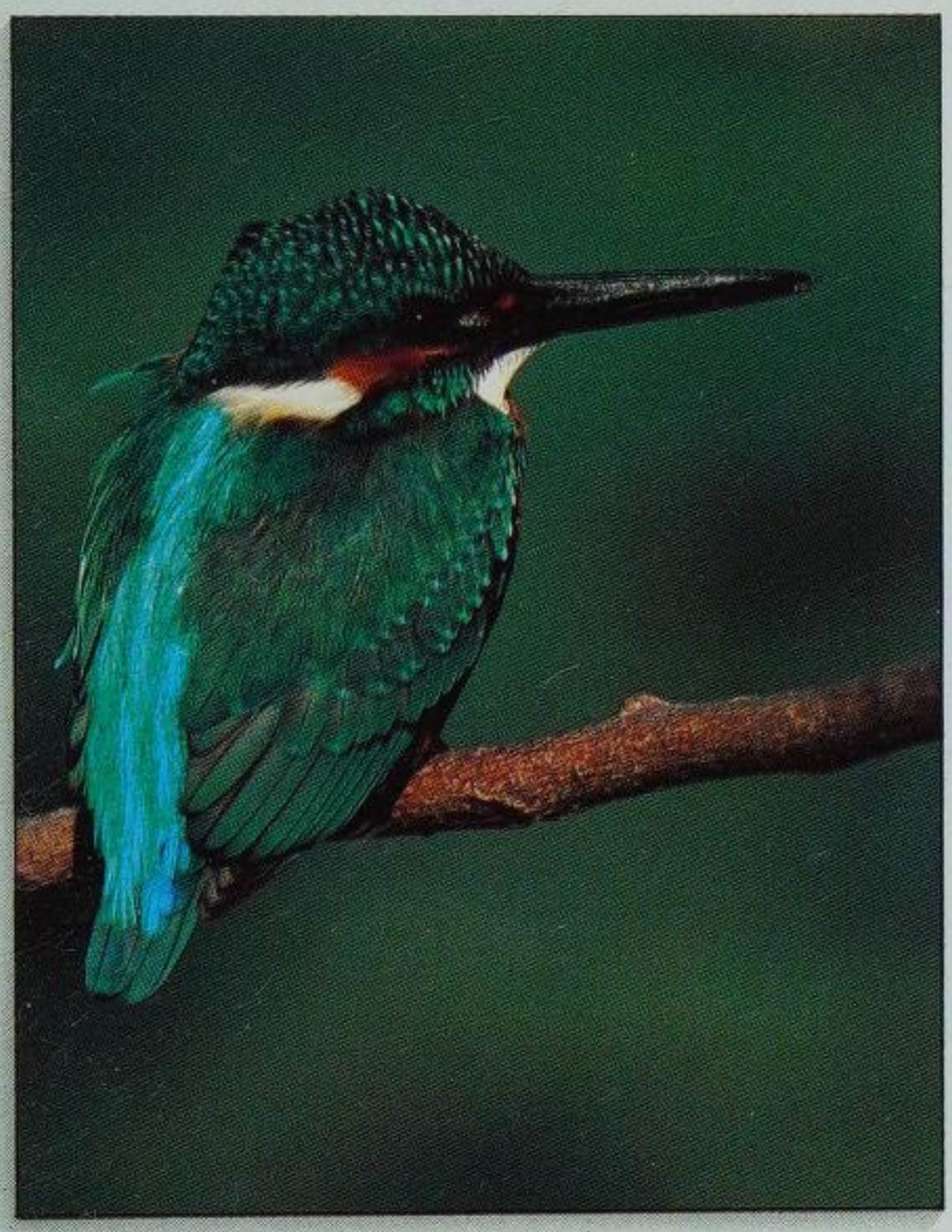
Out of the 8,650 species in the world India has as many as 1,200, and so on a land surface of only 4 percent it has 16 percent of the total number on the earth. If subspecies are included there are 2,061 forms in all, and out of these 1,750 are residents and the rest are migrants. If vagrants and pelagic species like shearwaters, petrels and boobies are included, the total may go up to 2,346. Ornithologists have classified birds into 27 Orders and 155 Families and India's status in ornithological terms can be judged from the fact that it has representatives from 20 Orders and 77 Families.

Easy access: In spite of urbanization there are places very near India's busy cities that have a wealth of birds. Any visitor to Mumbai with an interest in birds will find Borivali National Park, on the outskirts of the city, very rewarding, particularly during the migratory season from September to April. In a small stretch of country between the hills and the lake, he might well see a wide spectrum of both forest-dwelling as well as aquatic species – **racket-tailed drongos**, **tree pies**, **jungle owlets**, **minivets**, **ioras**, **golden orioles**, **magpie robins**, three species of **bulbuls** and of **sunbirds**, **hornbills**, **woodpeckers** and the dazzling **peacock**, India's national bird. With luck, even the gorgeous **paradise flycatcher**. On the damp meadows encircling the lakes, there will be **bee-eaters**, **kingfishers**, **drongos**, **mynas**, **pipits** and **larks**, while **swallows** and **swifts** hunt in the sky. In the water there can be **gulls** and **duck** of many species, with **plovers**, **egrets**, **herons** and maybe even an **osprey** plunging into the water to catch fish with its talons. Altogether, the Borivali National Park is a splendid place to see a multitude of species living cheek by jowl, yet in their separate micro-habitats.

An even more glamorous place than the Borivali National Park is the world-famous Keoladeo

Ghana (Bharatpur) National Park, just 30 miles (50 km) from Agra. It is one example of people's tampering with the natural ecosystem, resulting in a spectacular increase in its birdlife. It is the artificially maintained water levels within this comparatively small (11 sq mile/29 sq km) park that sustains its wealth of birdlife.

Bharatpur is considered to be unique in the total number of bird species as well as the quantity of birdlife that it harbors. It has an impressive assortment of land and arboreal birds, but the grand spectacle is provided by the aquatic species. For example there are four species of cormorants, eight species of egrets, three ibises, 17 species of duck and geese, and two species of crane, of which one, the **Siberian crane** *(Grus leucogeranus)* is one of the rarest species in the world, and Bharatpur is its only known wintering



ground in India – the cranes have thankfully reappeared after not arriving for several years, possibly due to poaching on their migration routes.

Protection: As in most countries, there is both national and international protection for birds. Under the Wildlife Protection Act of 1972 no birds except certain specified vermin like crows can be trapped and killed without a permit from the appropriate wildlife authority. Permits are granted only for game birds that are not endangered. But a most timely measure to check commercial exploitation by poachers is CITES, the Convention on International Trade in Endangered Species of Flora and Fauna, which came into force in 1975. This Convention has three schedules, and in Schedule I are listed those species that are totally protected. Some of the rarer protected bird species in India include the chir pheasant to which we have already referred, the **Himalayan monal** *(Lophophorus impejanus)*, **Sclater's monal** *(Lophophorus sclateri)*; **Blyth's** and **western tragopan**, the Siberian and the **black-necked crane**; the **great Indian** and **Houbara bustard**, the **Bengal florican**, and the **Nicobar pigeon**. With the stopping of imports by Western countries and the consequent ending of the high prices fetched by the sale of these birds, the main incentive for poaching is removed.

In an agricultural country birds play a very important role in the cross-pollination of flowers, the dispersal of seeds, and keeping insect pests under control. In his Azad Memorial Lecture, Dr Salim Ali said "over 50,000 species of insects have been described from the Indian subcontinent, doubtless with many more still to come. Many of them such as locusts, beetles, moths, caterpillars and termites are extremely harmful pests of agriculture and forestry upon which our national economy leans heavily." He went on to say that a single pair of **Colorado beetles** *(Leptinotarsa decemlineata)* "would without checks – in which birds play an important part – increase to 60 million in a year."

It is not realized what a significant role birds of prey play in keeping down rodent population. An owl, for example, is reputed to kill as many rats as 30 cats, and rodents destroy a substantial portion of India's food-grain production. Another way in which birds add to the health of the ecosystem is through guano, the droppings of fish-eating water birds, which is considered to be the finest nitrogenous fertilizer in the world. The famous Guano Islands off the coast of Peru are a major economic asset of that country. At least in one water-bird sanctuary in India, Vedanthangal near Chennai, the agriculturists surrounding the sanctuary area protect the birds because they recognize the value of guano as a fertilizer with matchless properties.

While, on the one hand, a conservation consciousness is growing in the country, and birds are not being wantonly destroyed, the increasing use of pesticides in agriculture and for public health has led to the death of birds, particularly birds of prey, which are at the top of the food chain. Grain-eating birds eat insects killed or contaminated with synthetic poisons. The toxic preparations are ingested into their systems and when they in turn are devoured by predatory birds, the predators either die or lay sterile eggs. It is to be hoped that biological control methods will soon replace the organo-chlorine and organo-phosphorus compounds which do such widespread damage to the

Left, tragopan, one of the several beautiful Himalayan pheasants and above, the diminutive common kingfisher.

environment. Bird watchers in India lament that the skies are virtually empty. The king vulture is hardly ever seen, and even birds like the white-eyed buzzard, which was so common in the past, are now rarities.

Birds are reputed to be good indicators of the health of our environment because their fast metabolism gives us an advance warning of environmental hazards to come. Humans must protect them even if only to protect themselves – for the early warning system they provide.

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The notes on birds that follow cover only a small and inevitably arbitrary sampling, but they attempt to include those species that are most common over the greater part of the region and are, therefore, most likely to be seen by the visitor. The keener naturalist can add many more birds to their list by visiting bird sanctuaries such as the Keoladeo Ghana in Bharatpur (Rajasthan), Vedanthangal (Tamil Nadu) and Nal Sarovar (Gujarat) for the winter migrants, and any of the many wildlife sanctuaries for resident species.

A SAMPLING OF BIRDS OF THE SUBCONTINENT

For the purpose of this guide it has seemed appropriate to list the birds not in taxonomical order, but according to the frequency with which they are likely to be encountered. For reasons of space the description has had to be, limited to size, main coloring (omitted for the commonest species) and the most noticeable characteristics.

House Crow *(Corvus splendens)*: In spite of the fact that this is the commonest bird in every locality that has a sizable human population, little is know about its life history. The nesting season, during which they make loose ungainly nests from all available material, is from April to June.

Koel *(Eudynamys scolopacea)*: The male is all black, about the same size but slimmer than the crow. The color of the male and the crimson eyes make identification easy. The female is brown, profusely spotted and barred with white. The male's loud, monotonous calls of *kuo kuo kuo* are a feature of the Indian summer, and are supposed to herald the monsoon. The female has a metallic clicking call that carries a long way.

The koel is the only bird that seems to outmaneuver the crow. The female manages to lay its egg in the crow's nest and the young koel often pushes the fledgling crows overboard.

Jungle Crow *(Corvus macrorhynchos)*: This bird is heavier than the house crow and is black all over, without a gray patch on the neck. It has recently begun to encroach on the territory of its smaller cousin, even invading highly populated areas, functioning side by side with the house crow. Although not as quick and bright as the house crow, it is physically stronger, and is responsible for destroying a large number of our smaller birds. The jungle crow is also a victim of the koel's "parasitism" during the nesting season.

House Sparrow *(Passer domesticus*; 6 inches/

2.3 cm): The busy twittering flocks of house sparrow are at home in the most congested localities. Indeed, the sparrow is a true commensal of people and breeds away from human environments only in exceptional circumstances.

Pariah Kite *(Milvus migrans*; 24 inches/9.4 cm): The commonest bird of prey in Indian skies. Despite its unflattering name ("pariah" means scavenger), it is a rather beautiful bird. With the general look of an eagle, it is reddish brown all over, and a good identification mark is its forked tail. In spite of its apparently leisurely flying habits, it can swoop swiftly and accurately in crowded city streets, and make off with some item in a dustbin or a sandwich in a child's hand. It perches and nests in high trees. Like many birds of prey it nests after the monsoon.

Brahminy Kite *(Haliastur indus)*: Can be distinguished from the pariah kite by its white head and underparts and rounded not forked tail. Both are likely to operate in the same areas, but the brahminy kite has a preference for picking rubbish off water surfaces, while the pariah is more terrestrial.

Mynas (Family *Sturnidae*): This family is widely distributed on the subcontinent and Sri Lanka. The **common myna** *(Acridotheris tristis*; 9 inches /3.5 cm) is perhaps the most characteristic of the birds of the subcontinent. It is thoroughly at home among humans. One size smaller than a dove, the common myna has a dark brown back with bright yellow legs and beak as well as a bare yellow patch on the face, and white patches on the wings, which show up conspicuously in flight. It does not depend on the discarded food of humans, because it is omnivorous and eats fruit, earthworms and insects.

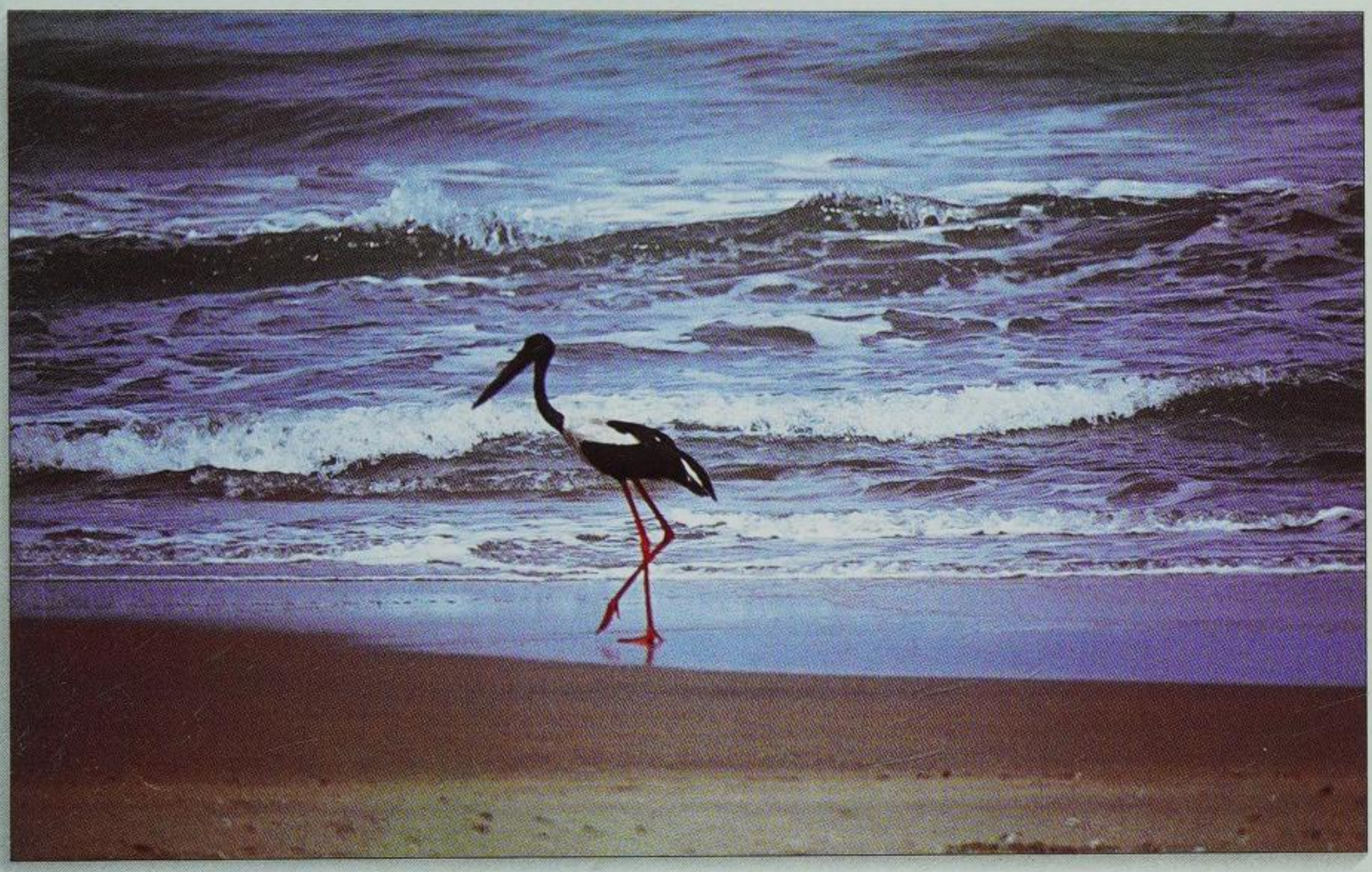
The nesting season is long-drawn (April–August). Mynas enjoy argument, and quite often small flocks can be seen screaming, fluttering and attacking one another on the ground. No casualties result.

Brahminy or **Blackheaded Myna** *(Sturnus pagodaram)*: A rather dressy creature; slightly smaller than the common myna, its glossy black crown contributes to its handsome looks. It is omnivorous, not averse to human society, and builds even inside human dwellings.

Bank Myna *(Acridotheris ginginianus)*: Common in north and northeastern India, this myna has a bare red patch around the eye. It is at home among people, and "saunters along confidently on [railway] platforms, in and out of passengers' feet." It nests in tunnels excavated along embankments and large groups build together in colonies.

There are two migrants in the Sturnidae Family, the **Rosy Pastor** *(Sturnus roseus)* and the **Starling** *(Sturnus vulgaris)*. The rosy pastor renders enormous service by devouring locusts and keeping their numbers under control in their breeding grounds in Central Asia.

Hill Myna *(Gracula religiosa)*: Well-known for its talking and mimicking skills, this bird was trapped in large numbers for export, and was a valuable foreign-exchange earner. It is found



Left, great cormorants on nest, Gal Oya, Sri Lanka and above, black-necked stork on sea coast.

mainly in the Himalayan foothills and in the Western Ghats.

Bulbuls (Family *Pycnonotidae*): The 120 species now placed in this Family are found only in the Old World, 19 in India, nine in Nepal and about six in Sri Lanka. Bulbuls are sober-colored but elegant birds. Most are olive green, yellow or brown, while one species is black.

Red Vented Bulbul *(Pycnonotus cafer)*: This, the commonest of the bulbuls, is very characteristically Indian. Bigger than a sparrow, slim and elegant, with a longish tail, it is mainly brown with a prominent black crest and a red patch under the tail. It is common throughout India, and can adapt itself to busy cities, although being arboreal it is less visible than the sparrow and myna. A liquid call from within a leafy shrub or tree is likely to be the first indication of its presence. This extremely pleasant call has resulted in its being known as "the Indian Nightingale" (there are no nightingales in India). The quiet beauty of its voice and looks, and its trusting disposition, have given it a special place in Urdu poetry.

Redwhiskered Bulbul *(Pycnonotus jocosus)*: Equally common, with its black recumbent crest and crimson cheek-patch, in addition to the red vent, this is a very attractive species.

Whitecheeked Bulbul *(Pycnonotus leucogenys)*: Though modestly wearing only a sulfur-yellow patch at the root of the tail, this bulbul has the liveliness of the Family. It is distributed south of the Himalaya down to Bombay, and eastwards up to Central India.

Purplerumped Sunbird *(Nectarinia zeylonica)*: Because of its general looks and habit of "hovering" in front of a flower, this is sometimes mistakenly called a hummingbird (there are no hummingbirds in India). Two sizes smaller than a sparrow, with a stumpy tail and a long thin curved beak, the male glistens in crimson, green and purple and its pale-yellow front is just the foil required to set off its brilliant upper plumage. Male and female are a devoted couple, always together, and are usually present wherever there are large bright flowers.

They breed throughout the year, nesting in the most exposed situations, but by a wonderful feat of camouflage, the nest is often mistaken for rubbish by friend and foe alike.

Purple Sunbird *(Nectarinia asiatica)*: This is really purple only during its breeding season. In

fact, at other times, the male assumes the sober light-yellow and brown appearance of the female. Nesting is mainly between March and May. The species is more widely distributed than the purple-rumped, and can be found throughout the country.

Even in this sparkling group the **Yellow backed Sunbird** *(Aethopyga siparaja)* with its distinctive yellow rump, is outstanding, and makes an arresting sight in evergreen forests.

Drongos (Family *Dicruridae*): These are solitary, insectivorous, and arboreal birds, mostly black and with a long forked tail. Of the 20 species in the east, nine are found in India. The commonest is the **Black Drongo** *(Dicrurus adsimilis)*, a slim, elegant all-black bird, easily

recognizable by its two long forked tail feathers. A white dot at the base of the bill is the hallmark of this species. Although smaller than a myna, the drongo is a tough character, and can often be seen chasing away crows from its territory. On the other hand, it does not hoard the nests or eggs of smaller birds, and several species find safety in building nests close to a drongo's. It is this watchdog activity that has earned it the Hindi name of *Kotwal* (policeman).

Parakeets (Family *Psittacidae*): There are no parrots in India, and what the visitor may be tempted to call a parrot will turn out to be, in fact, a parakeet. The shape is that of a parrot and the basic color is parrot-green; and over this the male **Rose-ringed Parakeet** *(Psittacula krameri)* has a dark pink stripe around its neck.

The rose-ringed parakeet makes itself conspicuous when noisy flocks streak across the sky to settle on a tree with ripening fruit. The early mornings and evenings are their working time, and owners of fruit trees have to continuously look for new ways of keeping them away.

Uninhibited in whatever they do, the parakeets have a prolonged courtship display in which the beak plays an important role. There are some handsome birds in this family. In Northern India the **Alexandrine** or **Large Indian Parakeet** *(Psittacula supatria)*, which is as large as a pigeon, can be identified by the maroon patch on the shoulder.

The **Blossom-headed parakeet** *(Psittacula cyanocephala)*, apart from its red head, also has maroon shoulder patches, but prefers the countryside to the city.

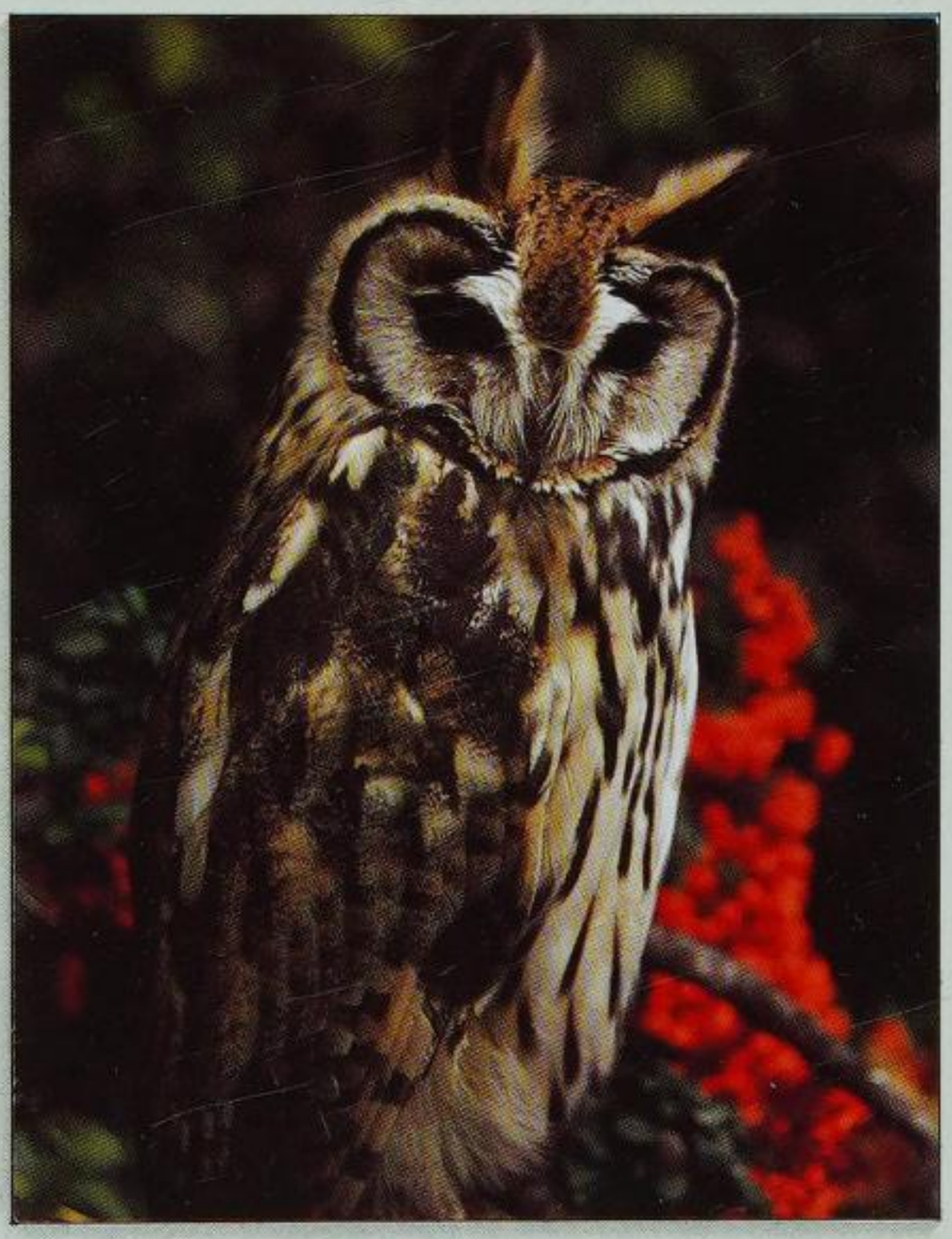
Crimson-breasted Barbet or **Coppersmith** *(Megalaima haemacephala)*: A bird that is heard by everybody but seen by few. Its loud repetitive tapping sound has been called "the most monotonous sound of the Indian countryside." If you do manage to follow the sound to its originator, you will see a dumpy bright-green bird (bigger than a sparrow) with a bright-red chest, yellow throat and heavy whiskers. It is widely distributed in India and is equally at home in an uninhabited forest and busy city.

Large Green Barbet *(Megalaima zeylanica)*: Another barbet more often heard than seen. It is larger than the myna – grass-green overall with a brown head. The colors merge completely with the foliage, and to add to the problems of the bird-watcher its *kutroo*, *kutroo*, *kutroo* calls have a ventriloquistic quality, leaving one wondering from which direction the sound comes.

Tailor Bird *(Orthotomus sutorius)*: This bird is so trusting that it even nests in bungalow verandahs. Two sizes smaller than a sparrow, it is olive-green with a chestnut cap and a long thin upright tail. Its *towit-towit-towit* calls go on for minutes on end. The Hindi name *durzee*, also pays tribute to its skill as a tailor. It sews itself a tidy little nest by stitching together, with twigs, the leaves of suitable plants and providing a professional inner lining.

Ashy Wren Warbler *(Prinia socialis)*: Frequenting small shrubs, this cousin of the tailor bird is about the same size and shape. It is dark gray above and creamy below, with a loose dangling tail. The nest, which it constructs in low bushes, is a poor imitation of the tailor bird's. Like the latter, it calls vigorously for long periods from the tops of small trees.

Cattle Egret *(Bubulcus ibis)*: An all-white heron with a yellow bill and black legs. The



yellow bill, in contrast to the black bills of its cousins, is an easy identification mark. In the breeding season, during the rains, it acquires an orange-buff plumage on the head, neck and back. The birds often stand around grazing animals to snap up insects raised by their feet.

Little Egret *(Egretta garzetta)*: This bird has a black bill and legs and yellow feet. It was hunted in the old days for its ornamental, pure white feathers, which appear in the breeding season, and which were once in great demand for gracing women's hats.

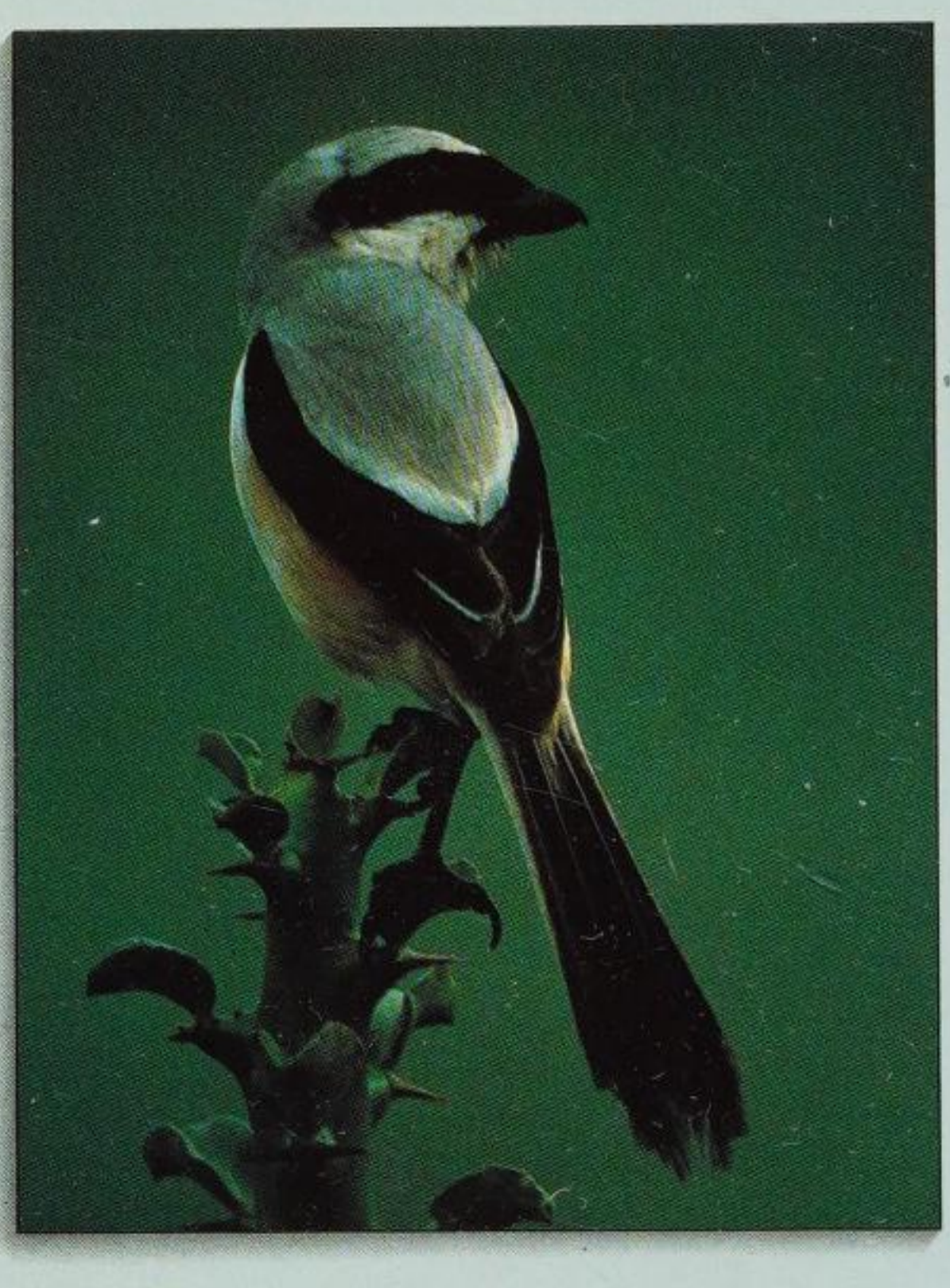
Pond Heron or **Paddy Bird** *(Ardeola grayii)*: A little smaller than the cattle egret, this is a very widely dispersed species, found wherever there is water, whether fresh or brackish – on the coast or

Left, barn owls, common throughout South Asia and right, the long-eared owl is a winter visitor to northern India.

around the meanest pond. It has phenomenal patience and will wait frozen for long periods in the hope that a frog, fish or crab will blunder within striking distance of its powerful bill. When at rest, it is all brown, but in flight the white wings and rump show up prominently. Like all herons, it is capable only of a harsh croak when communication is necessary.

Night Heron *(Nycticorax nycticorax)*: The heron that city dwellers are likely to come across, it is a little larger than the pond heron, gray-black above and white below. It is gregarious and often roost in colonies, departing after sunset to its favorite marsh for feeding. During this flight its loud *kwaark kwaark* is invariably heard.

Flycatchers (Family *Muscicapidae*): Literally catchers of flies, they can twist and turn with incredible dexterity while chasing their prey. Of



the 378 known species, India has 38. Many of these reside in the Himalaya and the Western Ghats, but some are at home in the plains.

Paradise Flycatcher *(Terpsiphone paradisi)*: Undoubtedly the most gorgeous, it is about the size of a bulbul, silvery white with a glistening black crest and long pliant tail feathers. The female is chocolate-brown and lacks the ribbon-like tail, but is most engaging nonetheless.

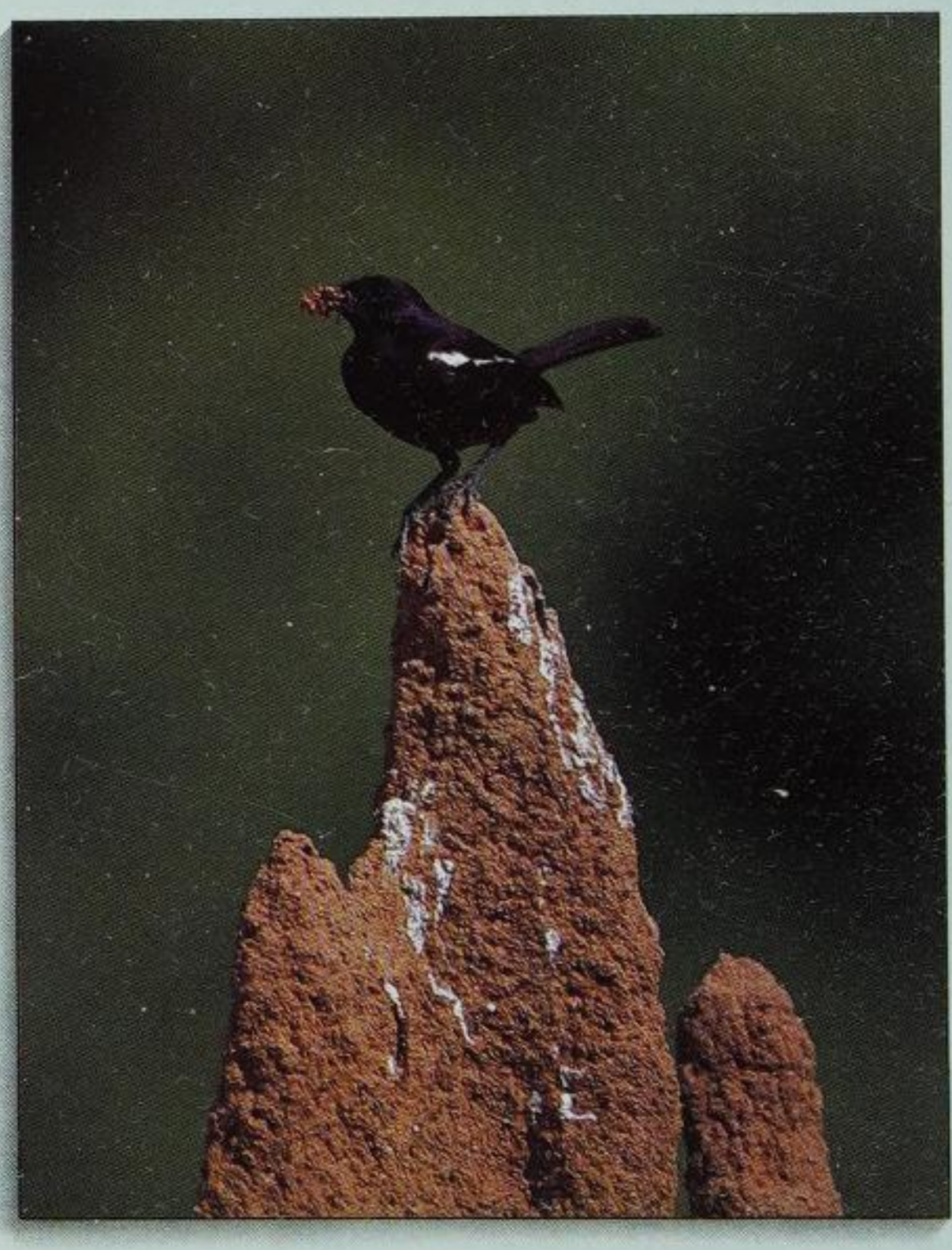
White Spotted Fantail Flycatcher *(Rhipidura albicollis)*: Another lovely creature – smoky-brown, about the size of a sparrow, with a distinctive white eyebrow and white-spotted front. It will waltz about on a branch with its fan-like tail spread out.

Tickell's Blue Flycatcher *(Muscicapa tickelliae)*: Is mainly blue with a pale-orange breast. Sparrow-sized, like all members of the family, it is hardly ever at rest, and it has a pleasant jingling song that is usually the first sign of its presence.

Water birds: There are some water birds that are generally found together, whether along the coast or in and around an inland water body. While some fly back and forth, plunging into the water when prey is sighted, others walk in the squelch within close reach of their food. Each species has its own specialized food.

Gulbilled tern *(Gelochelidon nilotica)*: Easy to identify because of its silver-white feathers and, in contrast to other terns, by its black bill and legs.

Brown-headed Gull *(Larus brunnlicephalus)* and **Black-headed Gull** *(Larus ridibundus)*: The commonest of the gulls in India, seen usually in



large congregations. In flight the former can be identified by a white circle on its black primary feathers.

Common Sandpiper *(Tringa hypoleucos)*: Lives up to its name by being invariably present wherever there is a little stretch of water. It is brown above and white below and a streak of white extending upwards through the shoulder reveals its identity.

Spotted Sandpiper *(Tringa glareola)*: Shows up the spots on its back when it is lit up by the slanting rays of the sun in the morning or evening. The lack of the white intrusion on the brown shoulder is a useful clue for differentiating it from the commoner bird.

Green Shank *(Tringa nebularia)* and **Red**

Shank *(Tringa totanus)*: Both are large sandpipers, about the size of a partridge, but with long legs. Green shanks often give themselves away by their rather melodious *tew tew* calls, and they seem to have strong social bonds.

Blackwinged Stilt *(Himantopus himantopus)*: Always stand out in waterside congregations, conspicuous by their long red legs. They have weak flight, in which the legs trail behind the tail, but they are competent swimmers.

Little Ringed Plover *(Charadrius dubius)*: In a gathering of water birds it is easy to spot this plover. It is about the size of a quail, with yellow legs and a black band around the neck. Like many other plovers, it employs the "broken-wing technique" to protect its nest from predators. It will pretend to have broken its wing, trailing it to the ground, and thus induces the pursuer to follow hopefully. Then it flies off suddenly when the predator, human or beast, is some distance from the nest. The nest is merely a scrape in the ground, and the bird relies on the obliterative coloring of the eggs, and of its own body, for camouflage.

Golden Plover *(Pluvialis dominica)* and **Gray Plover** *(Pluvialis squatarola)*: Two attractive water birds, about the size of a partridge, which migrate to India. The former species, brown above, decorated with gold, favors moist pasture land while the gray plovers without the gold coloring are usually found along the coast. They take a few swift steps, stop erect for a moment, dip down quickly, pick up a morsel, and move along again.

Bird-watchers are sometimes treated to an exhibition of a flock of small birds turning and twisting in flight in perfect unison, and are left wondering whether there is a leader directing operations. They are likely to be **Little Stints** *(Calidris minutus)*, migrants for the winter. They are smaller than quails, gray-brown above, white below and appear to be incredibly active.

Doves and **Pigeons** (Family *Columbidae*): These two names are to a certain extent interchangeable. The characteristic quality of these birds is that they can drink like horses by immersing their bills in the water and sucking it up. Most birds have to raise their heads to that the water can trickle down from the bills.

Blue Rock Pigeon *(Columba livia)*: Of the 20 species of pigeon in the subcontinent, this is the most common. Although there are wild populations, they are also partial to the most congested localities, and are disliked for the mess they make in godowns, warehouses and other storage areas. Their throaty cooing and the bullying courtship display of the male, which the female tries to escape, is a familiar sight.

Green Pigeon *(Tretron Phoenicoptera)*: These are found in the hills and in wooded areas. They are modestly but attractively colored, in shades of green, purple and yellow. Because of their tasty flesh, built on a diet of fruit and berries, they are much sought-after for their flesh.

There are nine species of doves in India, of which four are fairly common, and their English

Left, gray shrike; Indian robin on termite mound and above, stone plover.

names give a hint about their general appearance. All of them are a little larger than the myna.

Collared Dove *(Streptopelia decaocto)*: This has a prominent black hind collar on its soft brown neck, and is found in the drier portions of India.

Spotted Dove *(Streptopelia chinensis)*: This is the most widely distributed and can be identified by the white spots against a dark background on the back and sides of the neck.

It is a curious fact that in its *kruk kru kroo kroo* calls the final *kroo* is never repeated more than six times. Usually the effort ends with the third or fourth utterance.

Little Brown Dove *(Streptopelia senegalensis)*: Like the collared dove, a bird of the drier regions. Similarly colored as the jungle variety, but a slightly smaller bird that prefers drier areas.

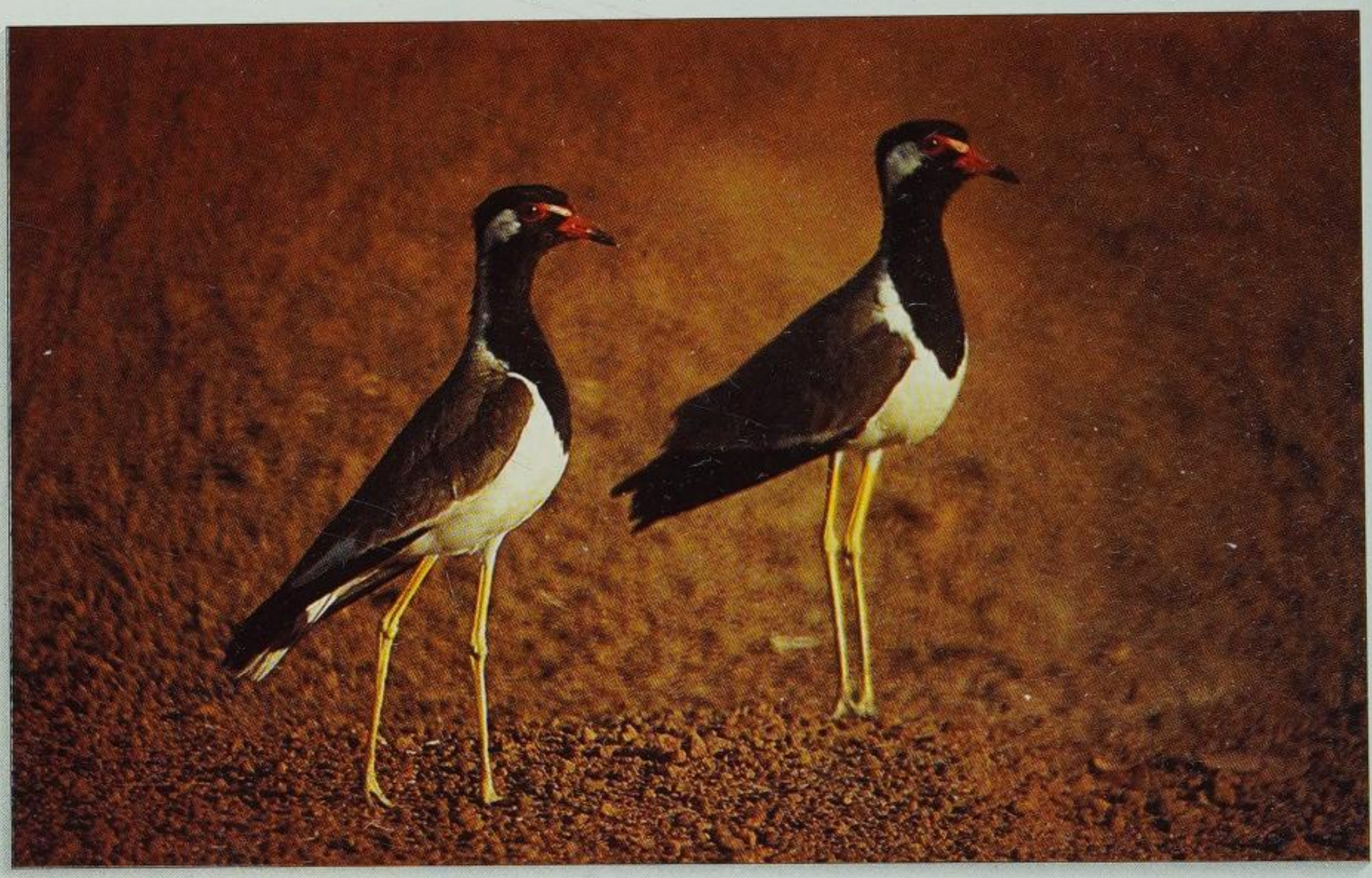
Babblers (Family *Muscicapidae*): This is an Old-World group of insect-eaters. They have short rounded wings and are poor fliers, but they have strong beaks and legs and spend much of their time turning over fallen leaves looking for worms and insects. They "babble" a great deal, hence their name. There are about 45 species of babblers in India.

Jungle Babbler *(Turdoides striatus)*: Smaller than the myna; a gray-brown bird with a yellow bill and legs and an untidy look about it. Known as the "Seven Sisters" because they move around in groups of about that number, they have strong family attachments and the young are sometimes fed not just by the parents, but also by members of the community. They are found in wooded areas and gardens where there is a reasonable quantity of leaf litter.

Common Babbler *(Turdoides caudatus)*: Among the many species of babblers inhabiting forested areas, this one needs to be mentioned for its exceptionally beautiful voice. It is about the size of a bulbul, with a white breast prominently spotted with brown. A group of birds calling together from the edges of an evergreen or deciduous jungle provides a joyful and melodious outpouring that is seldom excelled even in the bird world. Less attractive is the monotonous call of solitary birds rendered as "*he'll beat you*," repeated endlessly.

Spotted Babbler *(Pellorneum ruficeps)*:

Quaker Babbler *(Alcippe poioicephala)*: Somewhat similar in appearance to the spotted babbler and found in the same locality, this one also has a pretty voice. It is largely arboreal and more gregarious than the spotted species.



Whitebreasted Kingfisher *(Halcyon smyrnensis)*: Perhaps the most widely distributed, it is easily visible because of its penchant for sitting and calling from exposed locations. It is smaller than a pigeon, but its electric-blue wings, thick red beak, and white front catch the eye. Even a small patch of water, like a garden pool, may offer it a meal. Indeed, it is not dependent on water for its food and manages to survive in the driest of places on a varied diet.

Common Kingfisher *(Alcedo athis)*: Of bulbul size, with a white throat, orange breast, black bill and cobalt-blue wings and head, this is a well-distributed species in the old world. Since it is dependent on fish and aquatic insects, it is found

by the coast, along river banks, estuaries and around inland lakes and marshes. It nests between March and June in tunnels excavated in embankments.

Pied Kingfisher *(Ceryle rudis)*: A rather arresting bird, especially while it is hunting. It is black and white, larger than the myna. It flutters over water in a vertical position and plunges bill first to land on its prey.

Orioles (Family *Oriolidae*) – **Golden Oriole** *(Oriolus oriolus)*: In a competition to select the handsomest bird in India, this bird would certainly be short-listed. It is larger than a myna, golden yellow all over, with black wings and a pink bill. The black streak through the eye seems to say that no detail of its make-up has been overlooked and then its glorious long-drawn whistle compels the watcher to try and locate it. Orioles are completely arboreal.

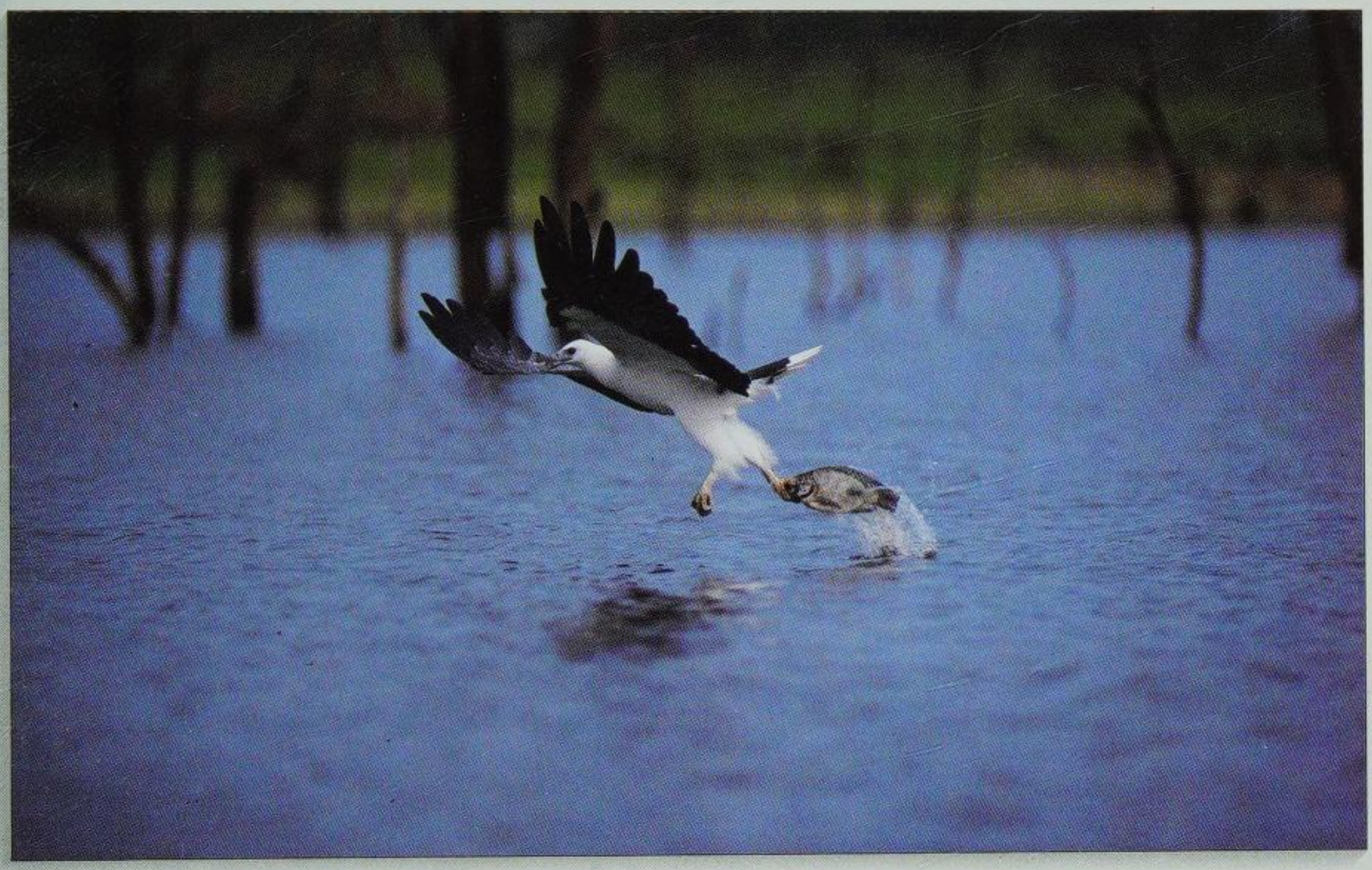
Black-headed Oriole *(Oriolus xanthornus)*: Lives only in well-wooded areas, and is therefore not as common as the golden. It is distinguished by its black head and throat. A harsh nasal *waak* usually reveals its presence.

Common lora *(Aegithina tiphia)*: Like many arboreal birds, it is likely to be heard before it is observed. Smaller than a sparrow, it is usually well camouflaged. During the non-breeding season, it is clothed in shades of mustard green. However, during the breeding season, the rich yellow and black coloring of the male catches the eye, particularly when it performs its courtship display by flying up and fluttering down in a manner obviously designed to display its brilliant colors. It has several beautiful calls, one of which spans a full octave.

Wagtails (Family *Motacillidae*): All species of wagtail share certain mannerisms – the tail wagging, the short spurts of running, and undulating flight.

Large Pied Wagtail *(Motacilla maderaspatensis)*: The only resident species of wagtail; about the size of a bulbul. During the breeding season (March–September), the male produces a pleasant song.

Gray Wagtail *(Motacilla caspica)*: In India breeds only in the Himalaya, and is the commonest of all migrants. As ringing data show, it has a remarkable tendency to return to the same spot year after year during its migrations.



White Wagtail *(Motacilla alba)*: Has a black head and a white face. Breeds in Kashmir and spreads out widely over the subcontinent in winter, sometimes reaching Sri Lanka.

Munias (Weaver Birds; family *Ploceidae*): Smaller than sparrows, munias are not true weavers as their untidy globular nests reveal. Of the seven species in India, the **Spotted Munia** *(Lonchura punctulata)*, the **White-throated** *(L. malabarica)* and the **White-backed** *(L. Striata)* are the commonest.

The English names give an indication of the color patterns of these birds, which are mainly brown and white. A rather elegant species, popu-

Left, red-wattled lapwings and above, the white-bellied sea eagle is seen along the coast of India and Sri Lanka.

lar as a cage bird, is the **Red Munia** or **Avadavat** *(Estrilda Amandava)*. Munias are very sociable birds, and unless preoccupied with feeding or preening, they stay closely huddled together. The stiff-legged courtship dance of the males, consisting of a leap upwards, returning to the same spot each time, is a comic but entertaining performance. Munias were caught in their thousands to be sold abroad as pets.

Roller or **Blue Jay** *(Coracias benghalensis)*: This pigeon-sized bird with a startling dark-blue plumage, brings the only touch of brilliant color to bare brown fields in the dry season. It is usually perched on electric wires adjoining agricultural lands, and from this vantage point it swoops down on insects, frogs or lizards on the ground.

Redwattled Lapwing *(Vanellus Indicus)*: This is a ground bird in the sense that it feeds and nests on the ground, but it is energetic in the air and often seen in rapid wheeling flight, calling stridently all the while. It is about the size of a partridge, but with long legs and its well-known call sounds like the plaintive question, "*Oh...did he do it?*" and leaves no doubt about its identity. The redwattled lapwing has a crimson wattle by the side of the eye while the **yellow wattled lapwing** *(Vanellus malabaricus)*, a bird of drier regions, has a yellow lappet in the same place.

Magpie Robin *(Copsychus saularis)*: A black and white version of the christmas card robin. Avoiding both city and jungle life, it patronizes gardens and groves. During the breeding season, just before the rains, it becomes both audible and visible, for its coat takes on a smart sheen, and it positions itself on a pillar, or top of a tree and sings loudly and unselfconsciously. It is said to be the most beautiful songster in the country. But in this respect its close cousin, the **Shama** *(Copsychus malabaricus)*, a denizen of forests, has an even more melodious and attractive song. The shama has a chestnut belly and a long drooping black and white tail.

The magpie robin is a good example of a songster that sings to establish territorial rights over its breeding area. Rival males are driven off by aggressive singing and posturing. In the event that a male is unable to establish its sway over a territory, it refuses to raise a family and leads a bachelor existence.

Birds of Prey: There are about 60 species of birds of prey in India, 12 in the Family *Falconidae* and 48 in *Acciptridae*. The pariah kite and the brahminy kite have already been mentioned.

Shikra *(Accipiter badius)*: Found everywhere, in open country, as well as in city gardens. It is the size of a pigeon, gray above and white below, closely cross-barred with brown. It flies with rapid wing beats and is among the most expert of hunters.

Harriers: In open country, during the migratory season in winter, harriers are an exciting feature of the environment. The **Pale Harrier** *(Circus macrourus)* is a little smaller than the pariah kite, ashy-gray with a black tip to its long pointed wings. In the words of one writer, it knows how to overcome the laws of gravitation as it sails close to the ground. A close cousin is the **Marsh Harrier** *(Circus aeruginosus)* of which the adult male is reddish-brown and the female and young are like a slender pariah kite with rounded tail and buff cap.

Blackwinged Kite *(Elanus caeruleus)*: A bird with a specialized hunting style. About the size of a jungle crow, it hovers in the air to take aim at a morsel on the ground and then parachutes down with wings held up at an angle to land on its prey. It is distributed patchily throughout the region.

Kestrel *(Falco tinnunculus)*: This is another bird of prey that hovers competently. A migrant from the Himalaya and beyond, though there is one resident race in distant South India. Pigeon-sized, it is brick-red above, with a gray head.

Red Headed Merlin *(Falco chicouera)*: Has a gray back and a red head. Pairs hunt in concert, leaving the quarry little chance to escape their talons.

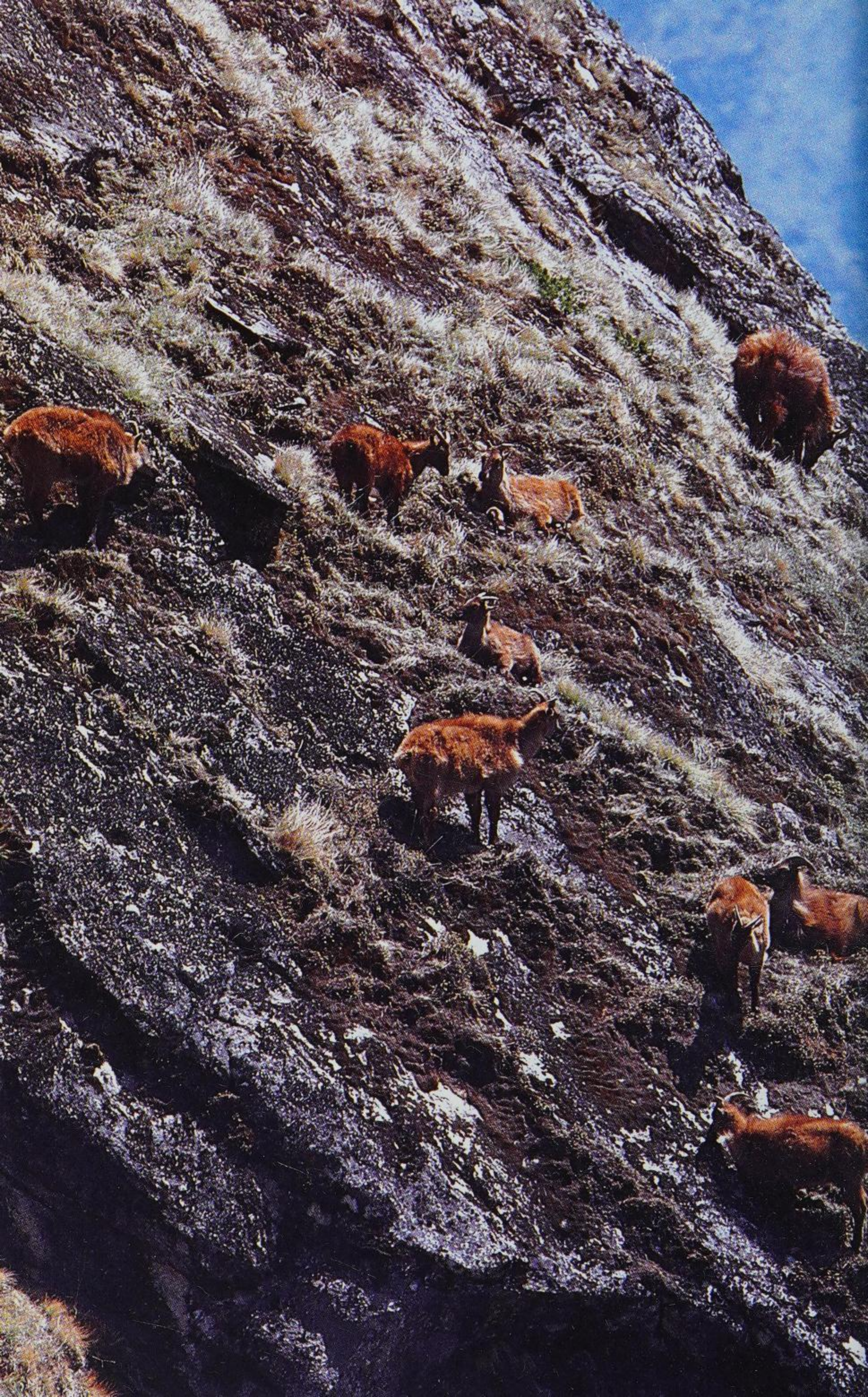
Vultures: Though classified with birds of prey, vultures are not hunters of live prey. They live on the carcasses of dead animals, offal, and some, like the **Scavenger Vulture** *(Neophron percnopterus)* even on human waste. India's vultures are currently in serious danger of extinction due to a rapidly-spreding virus that has them, literally, falling out of trees. Numbers of vulture have fallen by 90 percent and their disappearan ce is causing great difficulties for both the Parsi community (who rely on them to dispose of their corpses) and village Hindus, for whom they pick clean the carcasses of cattle. The disease has spread to Pakistan and Nepal and there is a great danger of it spreading on, through the Middle East, into Africa.

The **White-backed Vulture** *(Gyps bengalensis)* and the **Long-billed Vulture** (*Gyps lindica*) are the commonest.

The **King Vulture** *(Sarcogyps calvus)* is about as large as a peacock, minus the tail, and its high status amongst vultures can be seen from the respect it receives from the other species when the birds are gorging themselves on the flesh of an animal.

Vultures and kites have become unpopular because they cause aircraft crashes, but overall they render a tremendous service through their highly efficient scavenging operations, as India is learning to its cost as the vulture's numbers decrease through disease.

Immature open-billed storks.



WILDLIFE OF THE HIMALAYA

A Sanskrit proverb holds that "A hundred divine epochs would not suffice to describe all the marvels of the Himalaya" – so long to describe, how much longer to understand. Modern scientific study of Himalayan ecology has but touched a tiny tip of the knowledge to be learnt. But even that tip inexorably leads to the grimmest conclusions. Human onslaught has rendered the Himalaya amongst the most endangered environments in the world. In the subcontinent, the Himalaya rank as the region most in need of conservation, both because of the deterioration in environment and in view of our relative ignorance of the biology and ecology of high-altitude communities. Slowly, this begins to change but the task is immense. The Himalaya contain more endangered species of mammal than any other area of India and are remarkable in possessing almost one third of the world's mammalian species that could be called true mountain animals. M.K. Ranjitsinh has noted that "the outlook for wildlife in most parts of the Himalaya is grim, in some places even desperate," and G.B. Schaller warned that just as we are becoming more aware of the splendor of past and present wildlife of the Himalaya we are denying it a future. He describes mountains without wildlife as "stones of silence," an evocative and thought-provoking phrase.

Rich variety: What would we be losing? The youngest, largest and highest chain of mountains in the world, the Himalayan range must lay claim to being one of the most fascinating and spectacular natural wonders of our earth. To speak of the Himalaya may give a false impression of biological homogeneity when in fact it covers a wide and varied mosaic of different biotypes – east-west, north-south and altitudinally. Geologically divided into the three regions of trans-Himalaya, middle Himalaya, and outer Himalaya and Siwaliks, the vegetation ranges from the lush subtropical forests of the foothills to the bitterly cold high-altitude deserts of Ladakh and the Tibetan plateau. Thrown up 60–70 million years ago with activity still continuing, the Himalaya have acted both as a bridge and a barrier. The asymmetrical collision of the continental plates resulted in an inflow of oriental fauna through the northeast before the Afro-Mediterranean elements that followed through the northwest.

The present flora and fauna species of the east and west regions reflect this – the former showing a close relationship with the western-Chinese pattern and the latter having Euro-Mediterranean affinities. Besides these, many species have evolved from the previously present Central Asian or palaearctic fauna and given rise to high endemism with strong generic links to Tibet and Central Asia.

Elusive cat: No animal better epitomizes the character and concerns of the mountain environment than the **snow leopard** *(Panthera uncia)*, that beautiful and elusive cat of the high altitudes of Central Asia. A survivor of the icy rigors of the Pleistocene era, its range is immense, covering the entire Himalaya between altitudes as low as 6,000 ft (1,850 meters) in winter to 18,000 ft (5,550 meters) in summer. Being a shy inhabitant of remote habitats, it has seldom been seen by any but those humans sharing its mountainous home. Only recently have some facts emerged about the ecology of this high-altitude predator.

Somewhat smaller than the leopard *(Panthera pardus)*, but with a relatively longer tail, the snow leopard has a thick and beautiful spotted coat of soft gray, paling to pure white on the underside. This has certainly contributed to its rarity, for although strictly protected, many still fall to poachers' bullets and traps, for in the world of fashion there remain those ignorant, selfish and rich enough to make taking such risks worthwhile. The snow leopard uses large areas in order to obtain enough sustenance. In winter months, it sometimes ventures near villages to lift domestic livestock, but its main prey are the wild sheep and goats that share with it these stark and snowy wastes.

Mountain sheep: The Himalaya contain more species of sheep than any other mountain range. Pride of place must go to the **Marco Polo sheep** *(Ovis ammon polii)*, whose ratio of horn-length to body-weight exceeds that of any animal in the world. These horns form open graceful spirals with the tips arching up, out and then down again. A northern subspecies of the **argali** *(Ovis ammon)*, Marco Polo sheep may still be fairly common in the Russian Pamirs and Wakhan corridor of Afghanistan, but within the subcontinent it is a rare animal existing only in northern Hunza where its magnificent head has long attracted hunters. In its spartan, near-desert landscape home, particularly severe winters also take their toll of this grand creature.

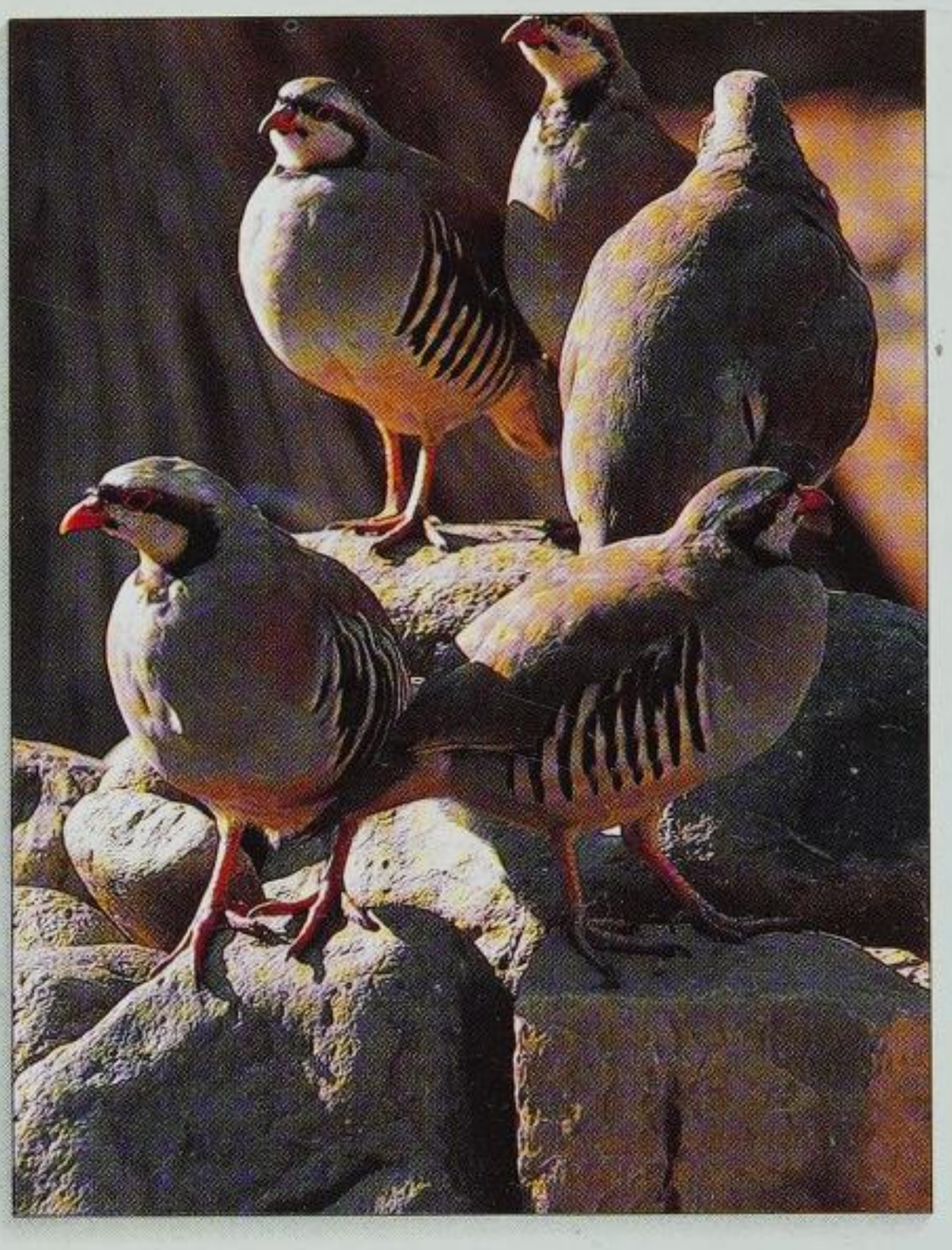
Another race of the argali is the **nayan** or **great Tibetan sheep** *(Ovis ammon hodgsoni)*. This is the largest of all wild sheep. Long in the leg and graceful, it inhabits the trans-Himalaya plateau, an area of desolate plains and low undulating hills, experiencing extreme temperatures, from

Preceding pages, the rare black-necked crane is confined to the Tibetan plateau and a few Himalayan valleys. Left, Himalayan tahr, Sagarmatha National Park, Nepal.

scorching summers to freezing winters. Nayan are migratory, wandering wherever food and water may be found, and are natural prey of the **Tibetan Wolf** which is the chief predator of the trans-Himalayan uplands and plateaus.

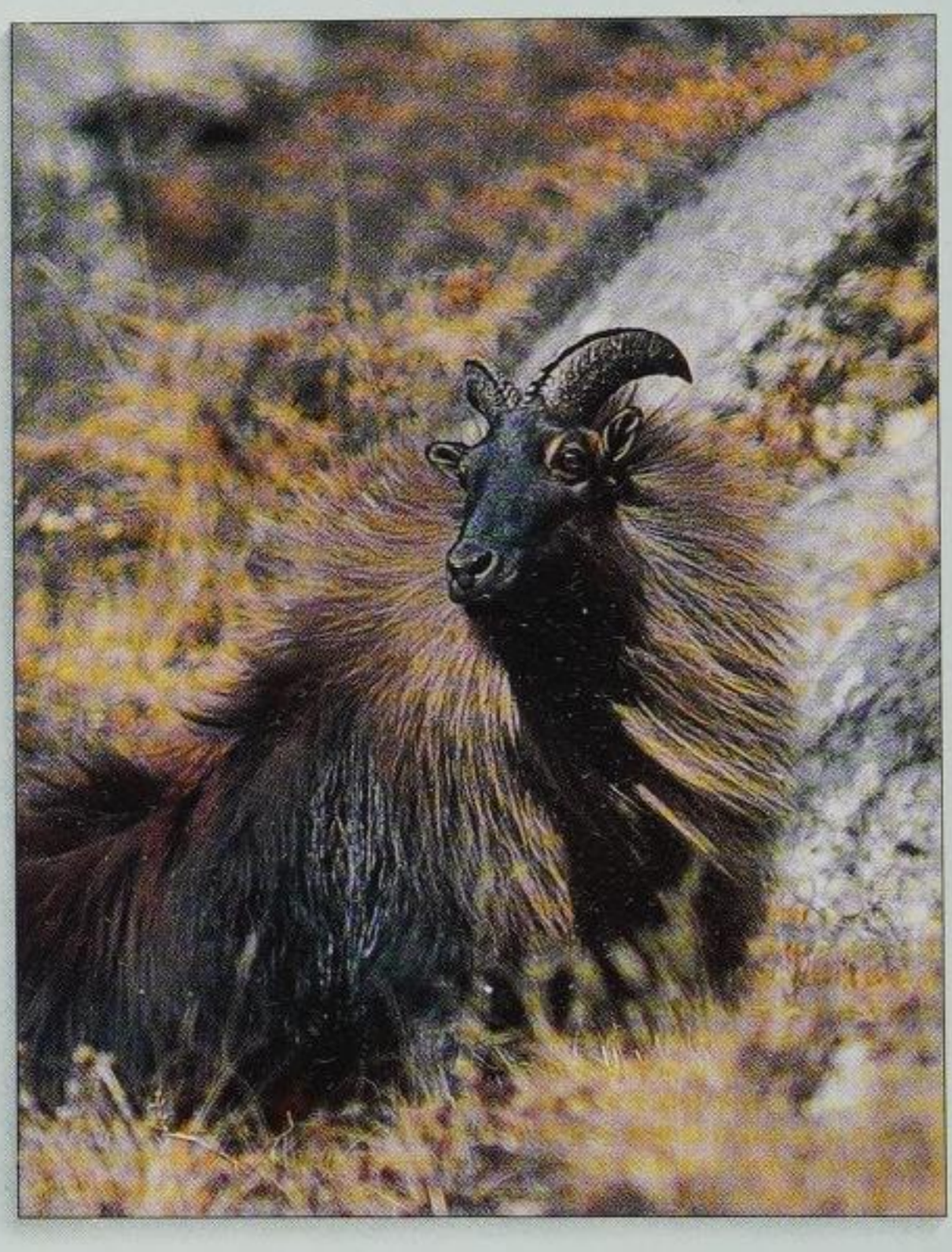
The **urial** or **shapu** *(Ovis orientalis)* is the smallest of the wild sheep and is distributed through the western Himalaya where several different races are distinguished. While horn shapes and colors differ, the adult rams all wear a great ruff growing from either side of the chin and extending down the throat. Adapted to differing environments, from the barren stony ranges of Sind and Baluchistan to steep grass hillslopes in Ladakh, this progenitor of domestic sheep has also attracted hunters' bullets and many populations have been decimated to rarity.

Another Himalayan mammal, originally classified as a sheep, is the **bharal** *(Pseudois nayaur)*. Its physical characteristics are so intermediate between sheep and goats that taxonomists have had trouble classifying it. Expressing thoughts on their evolution in his book, *Mountain Monarchs*, G.B. Schaller writes that "in general the behavioural evidence confirms the morphological evidence that bharal are basically goats. Many of the sheep-like traits of the bharal can be ascribed to convergent evolution, the results of the species having settled in a habitat which is usually occupied by sheep." For bharal, like sheep, graze on open slopes, whereas goats prefer more precipitous cliff habitats. It is an animal of the Himalaya and trans-Himalaya zones and is still common in places as far apart as Eastern Ladakh and Bhutan.



Mountain goats: The Himalaya house three species of true goat – the **ibex** *(Capra ibex)*, occupying the highest altitudes; with the **markhor** *(Capra falconeri)* and **wild goat** *(Capra hircus)*, inhabiting cliffs generally below 12,000 ft (3,700 meters). The ibex, found in the Himalaya west of the Satluj gorge, leads a tenuous existence in spite of its adaptability, as the balance between death and malnutrition in its austere habitat is delicate indeed. The spectacular markhor found in the Pir Panjal range and west to the Hindu Kush and Karakoram, lacks the underwool of the ibex and prefers to remain below the snow line. The markhor's horns are uniquely spiraling whereas the wild goat has scimitar horns similar to those of the ibex.

The **Himalayan tahr** *(Hemitragus jemlahicus)* differs from true goats in having short curved horns rather than long sweeping ones. This tahr is found throughout the Himalaya from the Pir Panjal to Sikkim and Bhutan in several vegetation zones between 8000 ft and 15,000 ft (2,500–4,500 meters) though rarely going far above the tree line. A beautiful and robust creature, the male Himalayan tahr has a conspicuous coppery brown ruff and mantle of flowing hair draping from the neck and shoulders to its knees and from its back and rump to its flanks and thighs.



Serow *(Capricornis sumatraensis)* and **goral** *(Nemorhaedus goral)*, two of a group known as goat-antelopes, are also found in both western and eastern areas. The third member of this group, the **takin** *(Budorcas taxicolor)*, a large heavily built relative of the musk-ox, is found only in restricted

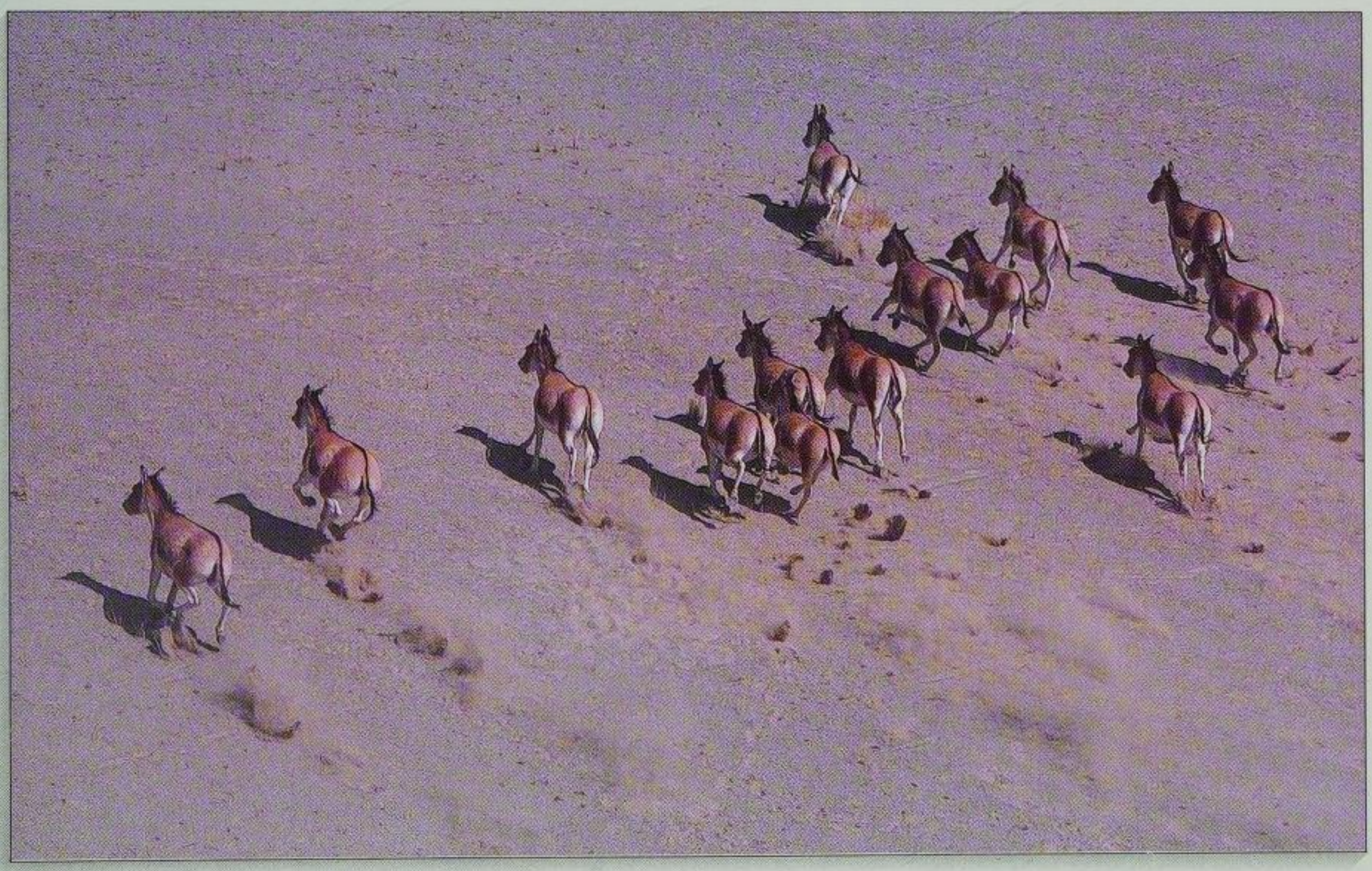
numbers in the eastern Himalaya. The Royal Government of Bhutan has declared it the national animal and set up special reserves for its protection. Gregarious by nature, the takin partakes of long seasonal migrations and is at home in general as well as rhododendron forest. The movements of serow and goral in their selected habitats are very restricted. The serow, solitary and reclusive by nature, occupies small cliffs and thickly forested ravines, whereas the goral prefers grassy slopes with broken ground, usually at lower altitudes in the southern Himalaya.

Ruminants: Evolutionally, the earliest known ruminants are the antelope and gazelle group of the family *Bovidae*. In the Himalaya they are represented by the **Tibetan antelope** or **chiru** *(Pantholops hodgsoni)*, and the **Tibetan gazelle** *(Procapra picticaudata)*. The chiru is another creature of the high Tibetan plateau and may also be found seasonally in northern and eastern Ladakh. With a special breathing system and the finest underwool to protect it from the extreme cold, the chiru is well adapted for the high altitude desert areas that constitute its home. Tibetan gazelle have all but disappeared in Ladakh though they may be found in Pakistan and Bhutan as well as in the Tibetan plateau.

Other animals that occasionally cross the main Himalayan divide in small numbers from the trans-Himalayan ranges are the **wild yak** *(Bos grunniens)* and **kiang**, the Tibetan wild ass *(Equus hemionus kiang)*. The yak is the largest animal of the mountains; massively built and heavily coated, it inhabits the coldest, wildest and most desolate areas and is one of the highest-dwelling animals in the world. The kiang, whose close relative runs in the Rann of Kutch in Gujarat, is another creature of the Tibetan plateau and plains of northern Ladakh.

Of the other ungulates of the Himalayan region the **sambar** and **barking deer**, though found at high altitudes in the southern Himalaya, are not truly mountain species. However, two species of **red deer** are endemic to the area and both are highly endangered. Indeed, the status of the **shou** – so-called **Sikkim stag** *(cervus elaphus wallichi)* though it was never found in Sikkim – is so uncertain that it may well already be extinct. The position of the **hangul** or **Kashmir stag** *(Cervus elaphus hanglu)*, is a little better with a population of around 500 living protected in the Dachigam National Park in Kashmir.

In contrast to the restricted ranges of these red deer, the **musk deer** *(Moschus moschiferus)* may be found over a wide area of central and north-eastern Asia. In spite of this, their status is hardly less endangered for the male carries the musk pod which, commanding exorbitant prices, has made the musk deer the chief target of every poacher in the Himalaya. Though protected by the most stringent laws, unscrupulous perfume manufacturers still encourage the decimation of this de-



Left, chukor are often seen in small coveys on bare, arid hillsides in the western Himalaya; the Himalaya tahr ranges from Pakistan to Arunachal Pradesh. Above, the kiang or Tibetan wild ass is restricted in India to a small area of Ladakh.

lightful creature. Threatened thus throughout its range, the best chances for viewing it are within preserved areas such as the Kedarnath Musk Deer Sanctuary in Uttar Pradesh and the Sagarmartha National Park in Nepal.

Bears: The ungulates described here constitute the largest group of mammals in the Himalaya and many are the main prey species of the larger predators. Though the snow leopard may be the most spectacular of these, the largest carnivore of the mountain species is the **brown bear** *(Ursus arctos isabellinus)*. Once abundant in the Himalaya, in some parts of its range the brown bear is now even more seriously threatened than the snow leopard. As an inhabitant of the less-vegetation-rich higher altitudes, the brown bear is more of a predator than its lower-living relative, the **Himalayan black bear** *(Selenarctos thibetanus)* whose ratio of fruit to flesh is higher. But the black bear is also omnivorous and a great meat lover, scavenging carcasses as well as occasionally bringing down sick or young prey of its own. The black bear has the largest range of all the Himalayan mammals, extending over the full mountain range and into Southeast Asia. Safer from human attack than most of the large Himalayan species, it nevertheless comes into conflict with people due to its prospensity for crop raiding. Being especially fond of maize, many injuries and deaths on both sides occur during the harvesting season. A third member of the bear family to be listed amongst Himalayan fauna is the **Tibeten blue bear**, but it is so rare that almost nothing is known of it.

Wild dogs and cats: Distant evolutionary relatives of the bear family are the dogs. The most conspicuous representative in the Himalaya is the **wolf** *(Canis lupus)*. Feeding on hares and marmots as well as the larger goats and sheep, the wolf is an animal of the western region and may be found in Ladakh, where it is still relatively common. Another member of this family is the **wild dog** *(Cuon alpinus)*, which can be found in the Himalaya and trans-Himalaya, but its rarity in the more accessible areas makes its status uncertain and little information concerning it is available. Of this family, the **hill fox** *(Vulpes vulopes montana)* is the most widespread and common in many habitats. But fox pelts also command a good price and it is not ignored by the ubiquitous poacher.

Several members of the cat family may be included in the Himalayan fauna in that their ranges, including those of the tiger and leopard, extend deep into the Himalaya and at high altitudes. Of the lesser cats, some like the **jungle cat** are recognized as having a separate Himalayan race. However, there are two, other than the snow leopard, which are specifically mountain species – the **lynx** *(Felis lynx isabellina)*, and **Pallas's cat** *(Felis manul)*. The latter is a Central-Asian species and though found in Ladakh, is rare and apparently restricted to the lower Indus valley there. The lynx, which occurs in the upper Indus valley, Gilgit, Ladakh and Tibet, is a race of the

The monal or Impeyan pheasant is the national bird of Nepal, where it is also known as the *danphe* (bird of nine colors)

lynx of northern Europe and Asia. Similarly rare, both Pallas' cat and the lynx are threatened by trapping and shooting.

Smaller species: Besides these larger animals, there is a diversity of smaller species – hares, mouse hares, bats, weasels, martens and more – with varying degrees of rarity, range and reports. It is impossible to describe all here, but mention must be made of the two races of marmot, the **Himalayan marmot** *(Marmota bobak)*, and the **long-tailed marmot** *(Marmota caudata)*, both endearing and common creatures of the higher Himalaya. The **red panda** *(Aliurus fulgens)*, a small animal which extends east from the Nepal Himalaya, is another well-known lesser mammal of the range. Colorful, it is largely arboreal and nocturnal so is seldom seen in the wild.

Birds: The avifauna of the Himalaya similarly present a fascinating and varied range of species, mainly a conglomerate of palaearctic and Indo-Chinese elements, the former predominating in the western section and the latter richly represented in the eastern areas. Several bird families are endemic to the Himalaya including **broadbills**, **honeyguides**, **finfoots** and **parrotbills**. The **chir pheasant** and **mountain quail** are endemic and some 14 other palaearctic species, including the **Himalayan pied woodpecker**, **blackthroated jay** and beautiful **nuthatch**, are considered by Ripley to give strong evidence of relict forms.

Innumerable and diverse, the colorful species of birds that colonize the Himalayan region defy generalization and the several volumes covering various regions should be consulted by interested visitors. Yet some species must be mentioned. The **Himalayan pheasants** include such spectacular and gloriously plumed members as the resplendent **crimson tragopan** and the **monal** with its glistening rainbow plumage. The **blood pheasant**, so called for the blotches of crimson that streak its feathers, is distributed only in the eastern Himalaya and graphically exemplifies the Chinese influence in the avifauna there. Most common and abundant is the generally lower-altitude **kaleej pheasant**, of which five or six races are recognized. The dapper gray, black and chestnut **koklas pheasant** is found more or less on the entire length of the Himalayan system. The **eared pheasant** and **peacock pheasant** should perhaps be mentioned amongst the Himalayan *phasianidae*, though their distribution only touches on the far northeastern section. Others in this family are the **partridges** and snow cocks, the **Himalayan snow cock** and the **Tibetan snow cock.**

If for no other reason than their impressive size, two birds of prey of this region draw a mention. The **golden eagle**, a powerful hunter, 3.5 ft (1 meter) from beak to tail, is capable even of taking large mammals such as musk deer fawns and the newborn young of mountain sheep; the **lammergeier** or **bearded vulture** is best known for its habit of dropping bones from a height to splinter them on the rocks below, thus releasing the marrow and creating bone fragments on which it feeds.

Migration: The Himalaya are important in the context of Indian bird migration. Of the 2,100-odd species and subspecies of birds that comprise the subcontinent's avifauna, nearly 300 are winter visitors from the palaearctic region north of the Himalayan barrier. One of the most endangered migratory birds of the subcontinent, which nests around the high-altitude lakes of Eastern Ladakh, is the **blacknecked crane**. Hardly half a dozen pairs are known to breed there, though its extremely low known world population figure was increased by the discovery of a colony in China. Many of the geese and ducks to be seen in the north Indian wetlands in winter return to these high-altitude lakes for nesting between May and October. Apart from the host of long-distance trans-Himalaya migrants and those that descend to lower levels and the northern plains in winter, there are also species which partake of local seasonal migration within the Himalaya itself. One delightful though not too common example is the crimson-winged **wall creeper**, fascinating with its distinctly butterfly-like flight.

Until recently it was thought that the mountains formed an insuperable barrier so that migrating birds had to take circuitous routes following the courses of river valleys. However in 1981 it was established by Salim Ali, doyen of Indian ornithologists, that even small birds of starling size are able to withstand the cold and rarefield atmospheres at heights of 20,000–22,000 ft (6,000–6,700 meters) and some of the larger ducks, geese, eagles etc. have been observed at heights calculated to be even greater than this.

Forests: The below-tree line areas of the western region contain forests that have a close resemblance to European elements and a greater representation of conifers. Among them the aptly named **deodar**, *tree of the gods*, must rank as the most magnificent. Its massive height and girth make it much prized for its timber uses and some of the finest stands have fallen to the ax.

The colorful flowering of rhododendrons in their masses is an unforgettable Himalayan experience. The deep crimsons, reds, pinks and creamy yellows of the blooms have no better setting than their natural environment and backdrop of snowy peaks. The majority of the 80 varieties are found in the eastern Himalaya, which is also very rich in orchids, presenting a profusion of delicate shapes and colors. This eastern zone is at a lower altitude and has higher precipitation with a higher snow line, thus adding to its distinctive botanical identity.

WILDLIFE OF THE INDIAN DESERT

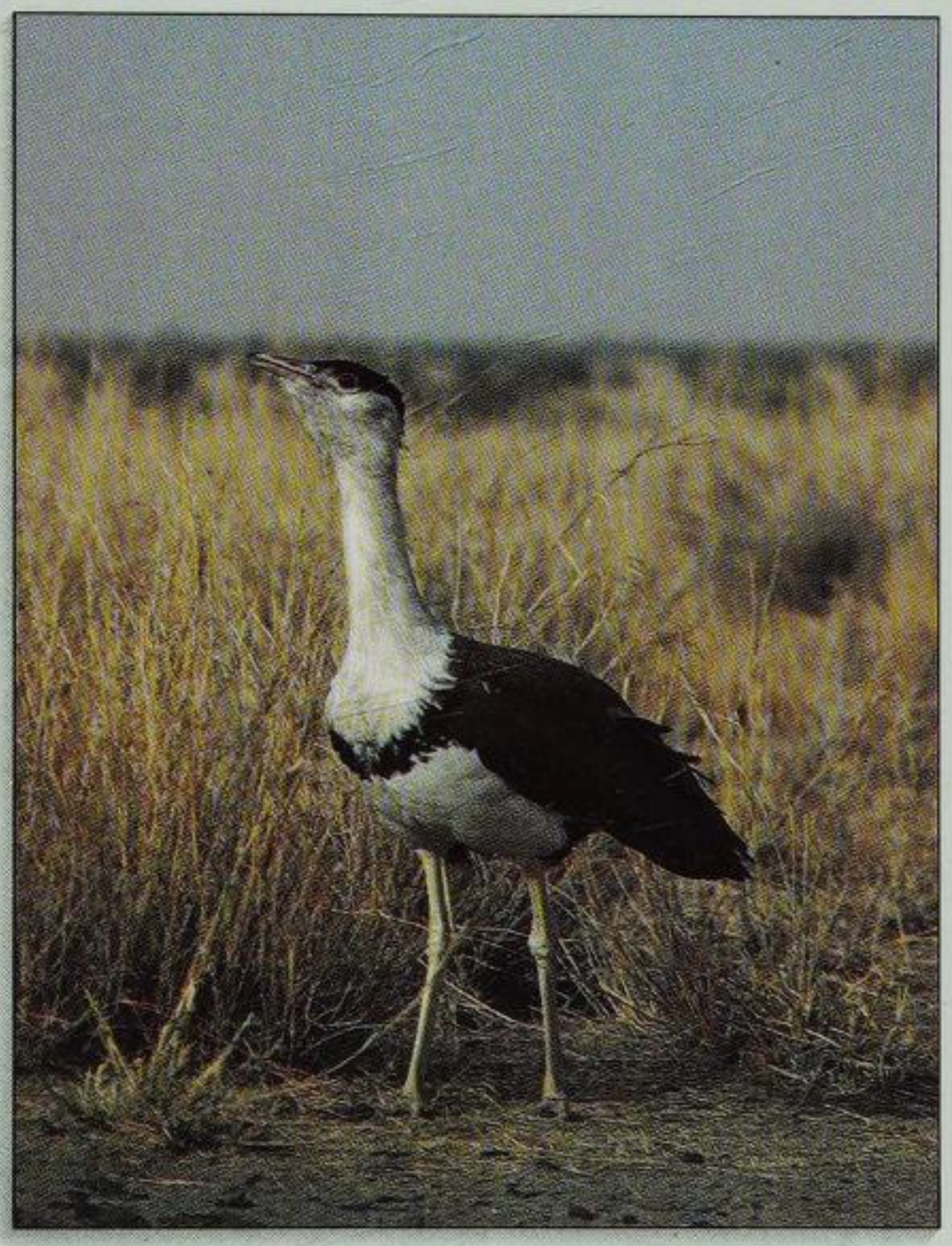
A desert environment is one where two basic needs of life – water and shelter, are at a premium and, therefore, it is not a biome in which any life form is likely to have originated. The story of life here is one of the heroic struggle of the survivors who adopted a strategy to withstand the harsh physical conditions – extreme paucity or total absence of free water, inhibitive high temperatures reaching over 130°F (55°C), and desiccation augmented by hot winds. At the other extreme, low temperatures, below zero, accentuated by bitter cold Himalayan winds are another challenging factor in certain deserts. Since the desert landforms of the world are far more recent (about 7 million years old) than the rainforests, the adaptations are often not in physical form but in behavioral pattern – an example of marvelous ecological adjustment rather than evolution.

The strenuous life activities of desert wildlife are concerned mainly with getting water, conserving this important resource, avoiding overheating, getting enough food, and avoiding and escaping from enemies while exposed in the coverless landscape.

The Great Indian Desert, also known as the Thar Desert, is situated between 22° and 32° north latitude in the states of Rajasthan and Gujarat, and lies across India's western frontier with Pakistan. It extends over 270,200 sq miles (700,000 sq km). Landforms such as shifting and fixed sand dunes, interdunal lands, rocky outcrops, flat pavements and salt flats of ephemeral lakes are some of the habitat types of the Thar. These are inhabited by a rich variety of plant and animal life.

Base of life: The Thar Desert is distinct in vegetative biomass, especially the sewan grass that covers extensive areas called *pali*. Typical shrubs are phog *(Calligonum pollinoides)* growing on sand dunes, khair *(Capparis decidua)*, a leafless shrub growing to a middle-size tree, aak *(Calotropis procera)* and thor *(Euphorbia caduca)*, representing the juicy shrubs. Jal *(Salvadora procera)*, khejra *(Prosopis sinreria)* and rohira *(Tecoma undulata)* are the main trees scattered very thinly over the desert. There are no cacti and there is no carpet of annual flowers. But khair, rohira and aak, when in flower in March, add color to the landscape and are the center of activity for insects and birds.

Most of the major insect orders are found in the Thar Desert. There are 17 species of termites. The colorful members are the **butterflies** of the group *Lepidoptera*. The **dung beetle** *(Coleoptera ordes)*, which rolls dung balls larger than itself, has an advanced form of a "copter" mechanism. Its flight wings, neatly placed under a hard cover, slide out as if under electronic automation for take off. The hot sandy areas are ideal for swarms of **locusts** and **grasshoppers**, many of which are brightly colored. The **velvet mite**, which has disappeared from many areas due to chemical sprays, is still to be seen in the desert. Moisture is the governing factor of all insect activity and insects spring to life with the first monsoon shower. They constitute an important source of protein for insectivorous birds and reptiles and even mammals, and being 60–85 percent water, a source of water too. They are thus an important ecological link as first-stage consumers and act as producers for the second-stage consumers – reptiles and birds.



Left, wild asses in the little Rann of Kutch, Gujarat. Right, conservation measures have helped the great Indian bustard make a comeback.

Reptiles: Forty-three reptile species inhabit the Indian desert today. The **spiny-tail lizard** *(Uromastix hardwickei)* lives in underground colonies in flat calcareous interdunal areas and *kankar* (limestone) pans. Its L-shaped burrow is 6–8 inches (15–20 cm) deep. Its design helps in withstanding sudden changes of weather conditions. The burrow is held exclusively by the owner. With a few drops of rain falling, one can observe the process of closing the hole. With moisture in the air, the calcareous nature of the soil helps to

seal the opening. The excavated earth heaped around the hole acts as a check-dam against sheet run-off of the rain water.

Though a snake called **pivana** (breath sucker) has been identified as the **Sind krait** *(Bungarus caevuleus)*, myths about the breath-sucking power of the viper continue to circulate all over the desert. It is the snake of the desert's core area.

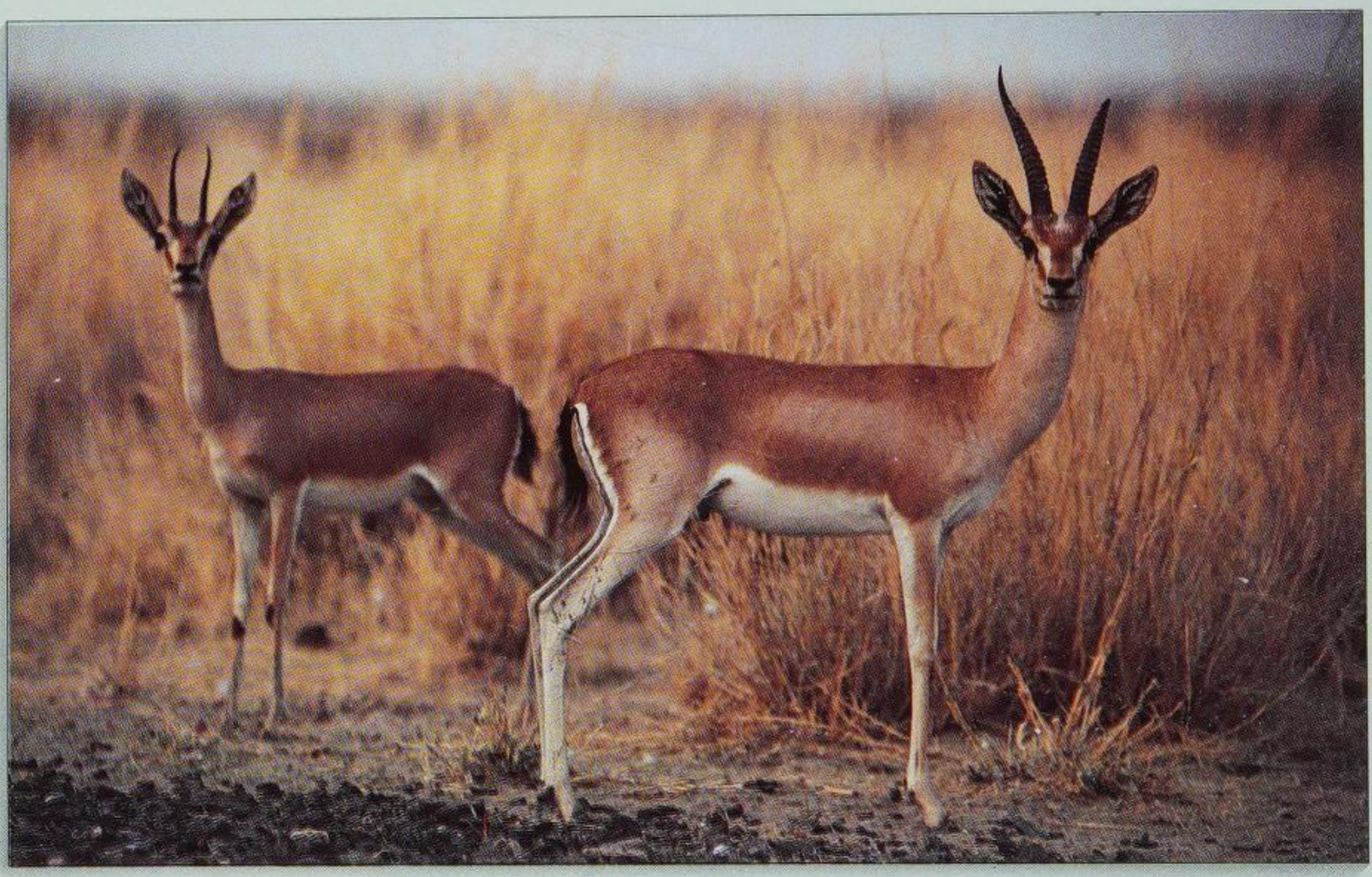
The deadly **saw-scaled viper** *(Echis caenatus)*, another poisonous snake, does not leave a serpentine mark on the sand. Its almost parallel lines created by its looping movement leave no clue of its direction of movement. The color of the **Russel's viper** *(Vipera russelli)* matches that of the sand so well that only by scanning the ground inch by inch can one discover the serpentine spring ready to uncoil and attack.

Desert monitors *(Varanus griseus and Varanus bengalensis)* are miniature dragons with dinosaurian looks. They raid nests, and feed on rodents and insects. The **toad agama** or **horned toad**, curiously named since it is no toad and has no horn, is actually a lizard. The blue, green, yellow, crimson, red and black spots in contrast to its sand-colored body, make it colorful. It screws itself into loose sand, to "swim" under it to escape predators.

The **sandfish** *(Ophiomorus tridactylus)* is another lizard that swims under sand. The color-changing **chameleons** are commonly seen on the bushes and trees looking for insects.

Wings of the desert: The avifauna of the desert is rich in both species and in population – numbers sometimes swelling to 2,000–4,000 birds at a single spot. No niche of the Thar is devoid of birds. Even in the face of challenging terrain, temperature and repeated deadly droughts, many species of birds have decided to be resident here.

Outstanding among the birds is the **great Indian bustard** *(Chriotis nigricaps)*. It weighs 18–30 lbs (8–14 kg) and stands 16 inches (40 cm) high on strong legs designed for walking. This tall, heavy bird can be seen walking with confidence and grace in the desert. It holds its head at an angle; its body feathers form a pattern of black bars and dots; its head looks like a crown; its snow-white neck makes it conspicuous in the landscape. While changing its feeding grounds or to escape danger, the bird reluctantly takes to the wing. The bustard feeds on a varied diet – cereals, grasshoppers, locusts, dung beetles, lizards, snakes, berries and small, sparrow-size birds. It lives in family flocks



of four to six but at times over 40 birds assemble on a feeding or breeding ground. A polygamous male every now and then inflates its neck air-sac and fluffs its feathers to display its size to court females.

Overhunting, since it provided substantial meat, trampling of its eggs (generally one, sometimes two and rarely four) by cattle, and loss and disturbance in its habitat, had not long ago reduced its numbers to near extinction. Thanks to public awareness and conservation efforts, including the establishment of the Desert National Park, the bustard population has recovered and is now placed at over 1,000 in the desert alone.

The morning silence of the desert is broken by a sudden twitter in the sky and one spots the flight

of a distant pair. A few more definite and louder twitters are heard in the same direction. These are the **Indian sandgrouse** *(Pterocles exustus)* flying for their morning drink. At a water hole they wheel and turn to land, first at some distance from the free water and later directly on the water hole. Soon they crowd in hundreds for the day's sip and take off, to return the next day – the same place, the same time. They live in small flocks of 10–15. They are distinguished by the male's chestnut band on his chest, spots on the body and a tapering long pintail. Similar is the watering behavior of **painted** and **spotted sandgrouse**. They feed on grass and grains and pick up grit to grind the grain between their powerful gizzard muscles.

The **gray partridge** *(Francolinus pondicerinus)* is known for its morning call and its elegant walk. It is the only species of the Francolinus genus that dares to live in the harsh desert. Its secret is its comparatively low dependence on drinking water. It lives in family coveys of 8–10 birds but separates in pairs for breeding in spring.

The **bush quail** *(Perdicula asiatica)* and the **common quail** *(Coturnix coturnix)* only inhabit the favorable fringes of the desert; they do not reach the core. The **peafowl** *(Pavo cristatus)* and **roseringed parakeet** *(Psittacula krameri)* live only close to human settlements where water is available and can hardly be called desert birds in the true sense. **Ring doves** *(Streptopelia decaocto)* are common and congregate at watering places in their hundreds. Spotted doves and red turtle doves are seldom seen.

Insectivorous birds like the **bee-eater** *(Merops superciliosus)*, **blue tailed bee-eater** *(Merops philippinus)*, **common bee-eater** *(Merops orientalis)*, **Indian roller** *(Coracias bengalensis)*, **larks, shrikes, orioles, drongos, babblers, flycatchers** and **warblers** enrich the avifauna. Among bulbuls, the **white-cheeked bulbul** *(Pycnonotus leucogenys)* is commonly seen on khair bushes.

Sparrows, including the **house-sparrow** *(Passer domesticus indicus)* and **Spanish sparrow** *(Passer hispaniolensis)* fly in gliding movements and congregate on khair bushes near waterholes in incredible numbers. They are in constant motion, diving into the leafless bush every time a predatory bird makes a swoop. **Whitethroated munia** *(Lonchura malabarica)* gather in small flocks and perch on dry bushes.

Left, male chinkaras and above, adult male black-buck fighting at the onset of the rut.

Winter visitors: The desert even attracts many visitors. Its rich food supply, clear, stormless weather, warm, sunny days and clear comfortable nights, attract birds of the temperate region. Hundreds of thousands of **common crane** *(Grus grus)* and **demoiselle crane** *(Anthropoides virgo)* pass through the desert during October on their to and fro winter migration. The cranes live in grassy depressions and along salt flats like Tal Chhapar, Kanodia Tal, the flood flanks of the Luni river and shallow drying lakes and open agricultural fields in the Saurashtra region of Gujarat. The graceful **greater flamingo** *(Phoenicopterus roseus)* and

the colorful **lesser flamingo** *(Phoenicopterus minor)* visit the shallow saline lakes all over the desert, including Sultanpur near Delhi. Their assemblies of over a thousand birds are seen in several places. In May and June, at Nal Sarovar (Gujarat) over 100,000 of these birds congregate. They probably assemble every summer to locate sites for their nesting somewhere in the Greater Rann of Kutch.

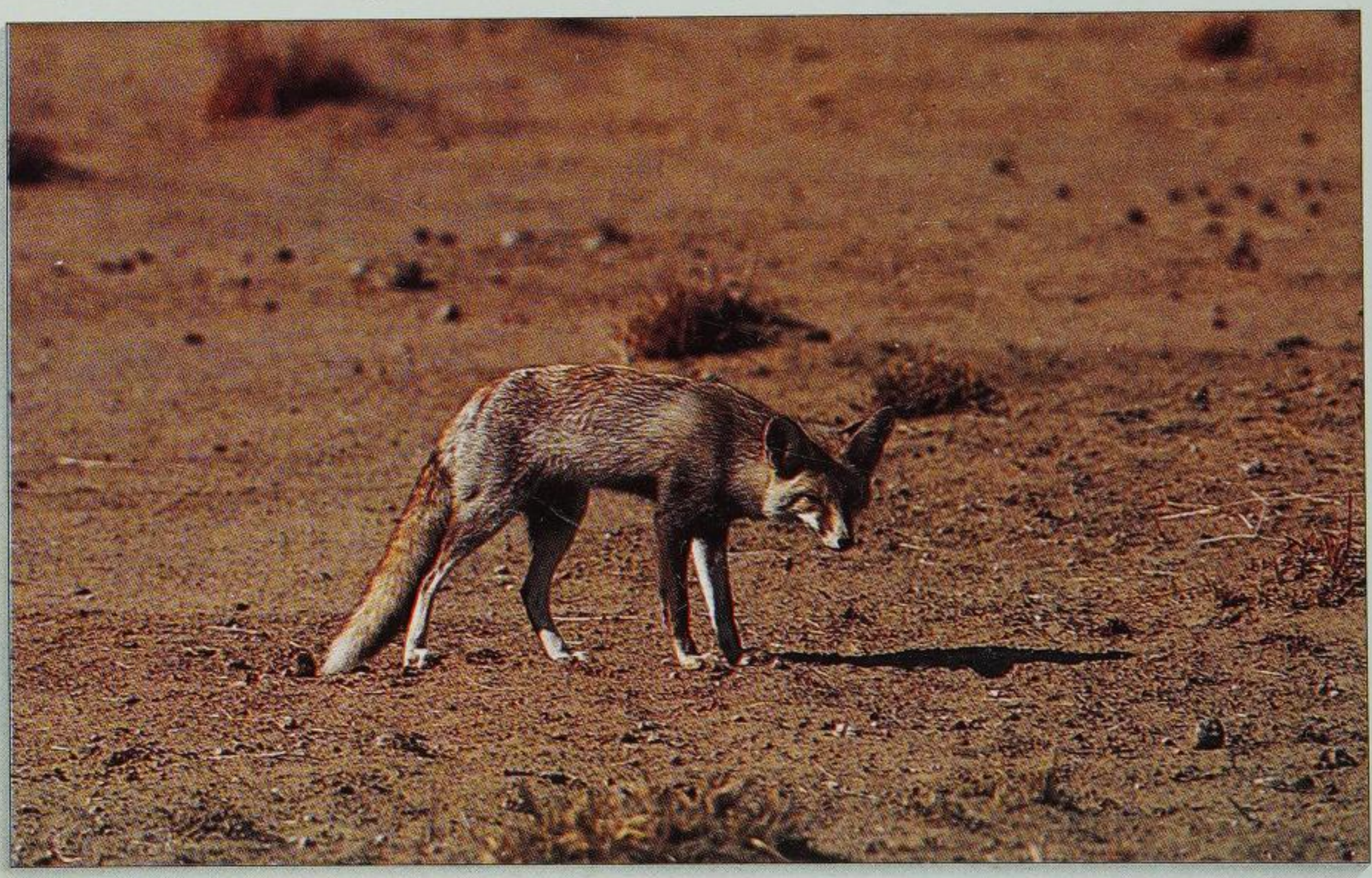
The saline points in the process of drying, if they happen to hold enough water till winter, attract **rosy** and **gray pelicans** *(Pelecanus onocrotalus* and *P. philippensis philippensis)* and migratory waterfowl – **barheaded geese** *(Anser indicus)*, **whistling teal** *(Dendrocygna javanica)*, **ruddy shelduck** *(Tadorna ferruginea)*, **pintail** *(Anas acuta)*, **shoveler** *(Anas crecca)*, **coot** *(Fulica atra)*, and waders including **curlew**, **sandpiper** *(Calidris testaceus)* and **snipe** *(Capella sops)*.

A significant event in Indian ornithology was the establishment of the fact that the **desert courser** *(Cursorius coromandelicus)* nests in the Indian desert. This bird is cream-colored and arrives in November to feed on termites and insects. The **Kashmir roller** *(Coracias garrulus)* arrives by October and stays till March. In contrast, **orioles** *(Oriolus oriolus)* visit the desert in hot summer and delight one with their melodious note. Migration of **rosy pastors** *(Sturnus roseus)* and **starlings** *(Sturnus vulgaris)* in swarms across the desert is seen in October and on their return flight in February–March.

The **houbara** *(Chlamydolis undulata macqueenii)* hit world headlines in the late 1960s when some oil-rich Arabs managed to persuade the Indian Government to permit them to hunt the birds with falcons. This "sport" created a problem since the size of the bag became a status symbol with the sheiks. The hunts played havoc with the population of this lesser bustard. In 1978, as a result of countrywide protest, this sport was ended once and for all.

The **sandgrouse**, identified by its black lower-half belly and wing tips, is a gregarious bird. Large flocks of them visit waterholes for a morning drink. They come in their thousands, without a single twitter. All one hears is the soft, whistling wing beats of the flying birds wheeling, landing and taking off.

The large **pintail sandgrouse** flies into the area in large flocks during winter, but not as large as reported by Alan Octavian Hume in the late 19th Century as "tens of thousands – like a thin cloud – darkening the air."



Antelope territory: The core of the desert ecosystem is the prime habitat of the true antelope, the **blackbuck** *(Antilope cervicapra)*. It inhabits the open plains, short grasslands and saline depressions called *chapper* or *rann*. It depends for its survival on its keen sight and high speed (40 miles/60 km per hour) with occasional leaps. It lives in large herds of 40 to 60 animals, mostly fawns and fawn-colored females and a few jet black, dominant, co-dominant, and light-colored, recessive bucks. The does are hornless, whereas the bucks have a pair of spiraled horns ending in a rapier-sharp tip, which lends the buck masculine magnificence.

Ferocious combats of territorial blackbuck are common. Rival bucks are chased away and the 20–30 doe harem is regrouped with an impressive display of speed and determination. They are short-grassland animals. They are water-dependent, and, therefore, do not venture into the waterless region of the desert. However, even highly brackish water is acceptable to them.

The buck was once the dominant mammal of the desert region but, as a result of merciless persecution over 50 years, it is now confined only to certain pockets. It is estimated that there are 15,000 in the Jodhpur District in areas that have been notified for strict protection, but the most impressive of them are to be seen in the Velavadar National Park in Gujarat where more than 2,500 of them live in a short-grassland area of less than 14 sq miles (36 sq km).

Striding across clumps of grass, the **gazelle**, or **chinkara** as it is also called, stops only on the crest of a sand dune. One wonders why this animal, having pointed hooves unsuited to walking on loose sand, has chosen to live in the desert. In fact, sand dunes form less than 10 percent of the Great Indian Desert, the other 90 percent consisting of craggy rocks, pavements, and compacted salt-lake bottoms, interdunal areas, and fixed dunes, for which the gazelle is well equipped to fly over at high speed. The gazelle is the only species of the Indian antelope of which the female have horns, vestigial though they be. The horns of males are over 9 inches (23 cm) long and are pointed at the tip, well adapted for a fight to the finish. The chinkara buck is able to stand up to desert predators, including large eagles and foxes.

Normally, one fawn (rarely two) is dropped after eight months of gestation. The most vulnerable period in the life of the gazelle is the period of parturition. But nature's scheme of protection by camouflage, and literally getting a fawn up on its legs in four to six hours, helps the newborn infant to follow its mothers to safety. But its principal survival strategy is to manage in situations of total absence of free water. It manages even where rain is a rare and chance occurrence and year after year may pass without even a trace of water vapour in the atmosphere. The gazelle is able to survive in these conditions because it has an inbuilt adaptive system to produce metabolic water in the physiological process of digestion. Its kidney chemistry is such that it can excrete highly concentrated urine, thus helping the body to economize on water. The gazelle is well distributed throughout the desert. There are some pockets where it is much less wary than elsewhere because it has received protection from the desert's human inhabitants, specially the Bishnois, and even the meat-eating Muslims.

The third member of the antelope group (not the family) is the **nilgai** *(Boselaphus tragocamelus)*, the largest antelope of India. Ecologically, the animal's heavy demand on forage is not in the interest of the meager forage resources of the desert and, therefore, its water-dependence has discouraged its distribution in the heartland of the Thar. It is actually the female that is called

Left, desert fox and above, gray partridges.

nilgai (blue cow) and the male, blue bull, though they have no resemblance to or relationship with the sacred cow. The bull is strong, with spiky horns totally out of proportion to its body size; they are more like spurs set in the wrong place. However, they are effective and efficient in ripping open a rival male during courtship quarrels. The fights between bulls are highly ritualized, starting with an arching of bodies, straining of necks, holding tails erect like flags, and looking slyly at each other from the corner of their eyes. They move in closing circles, finally falling on their knees, trying to get at each other's vulnerable points. The victim is chased out of the victor's territory enclosing the cows in estrus. Though the right of exclusive mating is fully demonstrated by the leader, recessive males sneak in to cover the cows while the dominant male is busy chasing away his rivals. After eight months of gestation, around September, when grasses and cover are sufficient, one fawn (occasionally two) is dropped. The increasing number of nilgai in certain areas, in the absence of a predator, is becoming a problem.

The pale-chestnut-colored **wild ass** *(Asinus hemionus khur)* of the desert is a fascinating creature – for its survival capacity, if for nothing else. Its body cells are capable of withstanding dehydration and also have the capacity of holding reserves of water when it is available – a perfect adaptive strategy in the harsh environment of the desert. The wild ass, an animal of the open sandy desert, is now confined to the Little Rann of Kutch. Its withdrawal from the sandy tracts to the *bet* (islands) in the Rann is recent. These "islands" within the temporary marshes provide a protected habitat to this endangered population, and hence its withdrawal there. Unfortunately, even from these *bets* the cattle of the Maldharis are edging the wild ass out. They now live mostly in *Prosopis juliflora* bushes, a modified habitat, on the fringes of the Rann. The bushes provide a good cover and their dry pods a sugar-rich diet. Normally, the ass feeds on grasses, salt-tolerant bushes and even the dry leaves of aak *(Calotropis procera)*. Like the antelope, this species relies on its keen sight and speed for its safety. It is capable of running at 40 miles (60 km) an hour. The wild ass lives in herds of 30 to 40 members (sometimes as large as 100) under the leadership of a stallion who guides the direction of movement. Their current population is estimated to be somewhat over 1,000 animals, all in the Little Rann.

Underground dwellers: The **desert gerbil** *(Meriones hurranae)* has adapted itself to living in extreme climates with temperatures of over 120°F (50°C) in summer and freezing nights in winter, when the temperature falls below zero. The hot winds, call *loo*, enhance desiccation, and cold winds from the Himalaya increase the chill at night. The gerbil's strategy for desert living is to burrow in the ground, where its living chambers are cooler by 40 percent and more humid by 45 percent than at the surface in summer and warmer by 70°F (20°C) in winter. It is active in the late evening, when the temperature is comfortable. It changes its feeding timetable in winter by becoming totally diurnal. Dr. Ishwari Prakash and his team experimented on the desert gerbil, feeding their sample on 100 percent dehydrated food for 21 months, without any adverse effect on the rodent's health. The secret of living without water, for months and even years, is its metabolic chemistry which, during the process of digestion, produces water.

The gerbil lives in colonies, sometimes in open fixed dunes, but mostly under khair or zizyphus bushes. The burrows are interconnected and have many escape routes. It feeds on grass seeds, fallen fruits and even stems. It also eats insects. Its long bushy tail is its rudder to balance and guide its direction while taking long leaps. The rich population, 800 burrows per hectare, provide sufficient food as well as water (since 65 percent of its body is water) to its predators.

Other common rodents of the desert are the **desert hare** *(Lepus nigricollis dayanus)* and the **hedgehog** *(Hemiechinus auritus)*. The hare is a fast runner and depends on its camouflage coloration when an enemy approaches. The hedgehog is purely nocturnal and rolls itself into a spiny unappetizing ball. The hare is purely vegetarian and the hedgehog an insectivorous rodent. Both live in burrows. The **common hare** *(Lepus nigricollis)*, with a gray or black nape, needs proximity to water. It is distributed on the fringes of the desert. The **crested porcupine** *(Hystrix indica)* occurs in the hilly terrain of Jalore and Siwana. It is totally nocturnal.

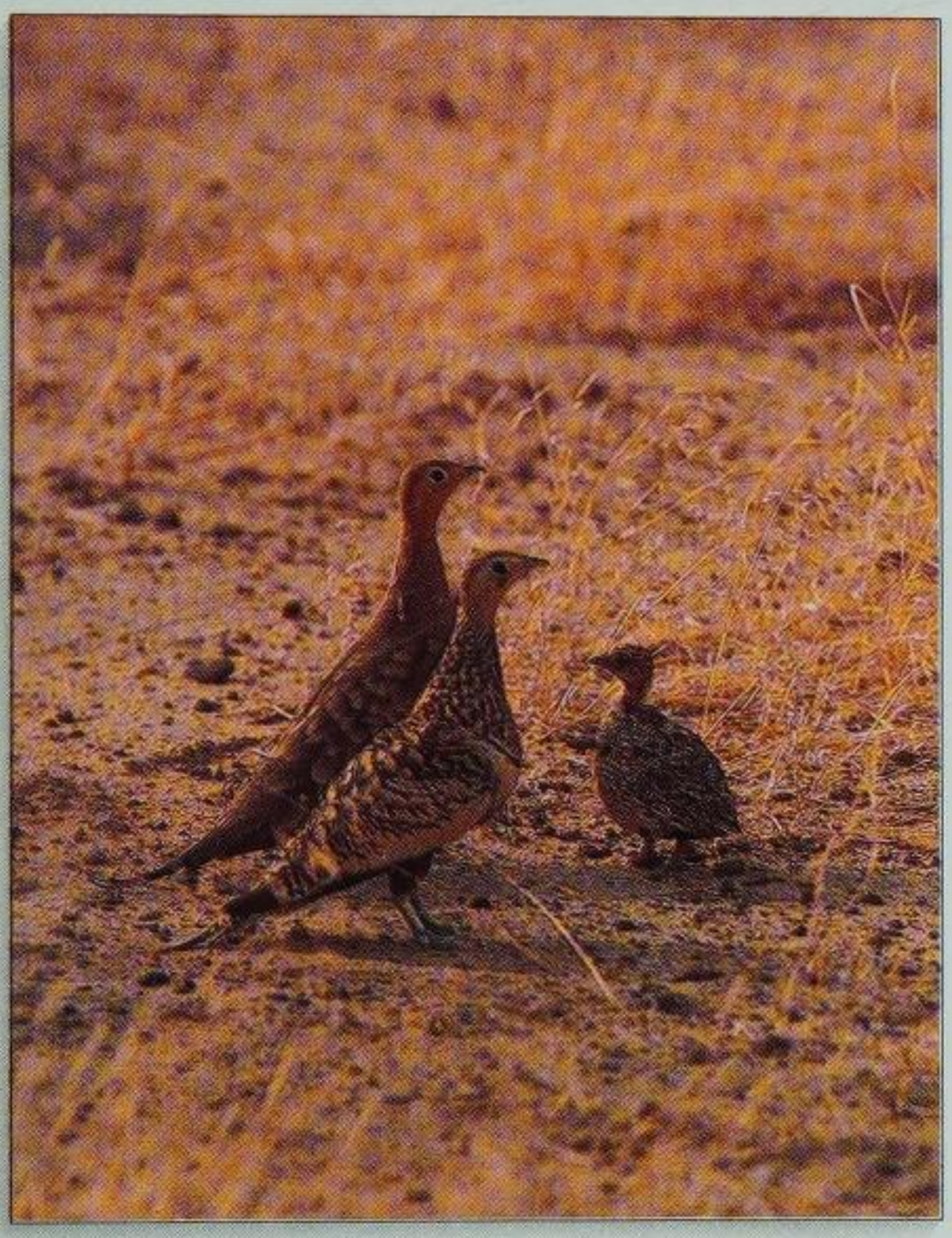
Predators: The main predator of the desert is the **Indian wolf** *(Canis lupus)*. Once widely distributed over the desert, preferring hilly and broken country, after massive destruction of the antelope, the wolf was forced to take to preying on sheep and goats and it soon became the shepherd's nightmare. It was therefore singled out for destruction, to be killed by any means, including smoking mothers and their pups to death in burrows. This very nearly dropped the final curtain for the species in the desert. It is now reduced to a dangerously low number, extremely limited in its distribution.

The Indian wolf preys not by chase but by surprise attack, and, therefore, does not need the company of other wolves. It lives in pairs or family packs and sometimes organizes cooperative hunting.

The **jackal** *(Canis aureus)*, widely believed to be strictly a scavenger, is also an effective predator, especially when helpless does are parturient

and the fawns are too weak to stand. It is absent in the core area of the desert owing to its need for water.

The **common fox** *(Vulpes bengalensis)* and the **desert fox** *(Vulpes vulpes)* are both widely but thinly distributed throughout the desert region. The common fox, distinguished by the black tip on its tail, is aggressive. It attacks gazelle and kills fawns and even grown females. The desert fox preys only on rodents, gerbils, desert hare, birds and reptiles like the spiny-tail lizard. A fox hole, especially when it has pups in it, is often located under the same bushes as those of the gerbils and in the midst of hundreds of their burrows. Why predator and prey live in such deadly proximity is still unexplained. The fox hunts during the cooler hours of the day to avoid over-consumption of water, which it obtains only from its prey.



There are also the predators of the air. The **blackwinged kite** *(Elanus caeruleus)*, **crested honey-buzzard** *(Pernis ptilorhynchus)*, **shikra** *(Accipiter badius)*, **tawny eagle** *(Aquila rapax)* and **laggar falcon** *(Falco biarmicus jugger)*, stay all the year round and nest in the desert. The owls and nightjars take over at night. The **short-eared owl** *(Asio flammeus)* and **spotted owlet** *(Athena brama)* are common. But the majority of the avian predators arrive almost with the influx of the prey birds. They include the **goshawk** *(Accipiter gentilis)*, **sparrowhawk** *(Accipiter nisus)*, **long-legged buzzard** *(Butea rufinus)*, **desert buzzard** *(Butea vulpinus)*, **Bonelli's hawk-eagle** *(Hieraetus fasciatus)*, **steppe-eagle** *(Aquila nipalensis)*, **greater spotted eagle** *(Aquila clanga)*, **lesser spotted eagle** *(Aquila pomarina)*, **Lanner falcon** *(Falco biarmicus cherrug)*, **peregrine falcon** *(Falco peregrinus)*, **oriental hobby** *(Falco severus)* and **Kestrel** *(Falco tinnunculus)*.

An Indian sandgrouse family.

The Thar is overcrowded with cattle, and hundreds of them die every day, leaving enough for the vultures to scavenge. The common among them are the **whiteback** *(Gyps bengalensis)*, **longbilled** *(Gyps indicus)* and **Egyptian vulture** *(Beophron percnopterus)*. The **king vulture** (*Torgos calvus*) is present in small numbers, mostly in pairs. The vultures cope with the arid climate and high temperature by shifting vertically. After an early morning meal, they soar at 3,000–4,000 ft (10–1,210 meters) in the cool air and descend only in the evening to roost.

The wide faunal spectrum of the Indian desert – insect to antelope and wolf – and its unique lifestyle, represent a finely balanced biological pyramid. But in the present context of "development plans," and the dream of "making the desert bloom," the Indian desert is in danger. It is already the most crowded desert of the world. The additional water, more cattle and more people being introduced in large numbers will increase congestion and destroy its essential nature. Much has already been destroyed by excessive cattle grazing, the reckless killing of wild animals, the removal of the natural vegetation for fuel and even the depletion of its underground water. Traditional patterns of human habitation fitted into their own niche within this complex and delicate ecosystem, but these have been discarded in the face of economic and population pressures.

This landform with its impressive and inspiring philosophy of living on a bare minimum – a lesson in ecological humility, deserves to be understood better. The Great Indian Desert, colorful and living with its natural wildlife, needs a better deal since it is India's only gene pool of drought-resistant species. It needs greater care in handling than other ecosystems, since it is one of the most fragile. An attempt to salvage a tiny dot of 1,220 sq miles (3,162 sq km) out of 270,000 sq miles (700,000 sq km) of natural desert, was made by establishing a Desert National Park 20 miles (32 km) west of Jaisalmer, to preserve a sample of the discipline of the desert. Despite its initial encouraging start, specially the steps taken to rebuild populations of vanishing species like the desert fox and the great Indian bustard, and preserving the spectacle of the landing sand-grouse and flocks of houbara, there has subsequently been some slackening of effort. Renewed and intensified action, including an expansion of the area of the park, is urgently called for if the initial progress is to be consolidated (indeed, if it is not to be lost).

MARINE LIFE

In February 1976, India declared an Exclusive Economic Zone along its extensive coastline and now has jurisdiction over 772,204 sq miles (2 million sq km) of sea area.

A rich and varied marine life is present in the Indian seas, which is also characterized by a diversity of habitats – the barrier reefs and atolls of the Lakshadweep Islands, the fringing reefs of the Andaman-Nicobar Islands, the Gulf of Mannar and the Gulf of Kutch, the mangrove and coastal lagoons, lakes, backwaters, estuaries and mud-flats, and the rocky and sandy shores, harboring myriad animal and plant species.

Human impact: People's greatest impact on marine life is in the coastal waters and estuaries. Using diverse types of fishing craft and gear, India alone fishes about 1.6 million tonnes of marine fish annually, with sardines, mackerel, Bombay-duck and prawns forming the major catches. **Thirutai** or **gray mullet** *(Mugil cephalus)*, **kanumbu** *(Mugil macrolepis)*, **Indian salmon** *(Polynemus indicus)* and **bhekti** *(Lates calcarifer)* in the hauls are not uncommon.

Marine penaeid prawns breed in the sea and the larvae of some species such as the **tiger prawn** *(Penaeus monodon)* and the **white prawn** *(P. indicus)* emigrate to the Cochin backwaters and with the tidal waters are allowed to enter the paddy fields through sluices, where they are netted every few days as the water is allowed to ebb with the tide.

Visit to Kovalam: Kovalam, the picturesque palm-fringed beach, 10 miles (16 km) south of Trivandrum, is also a place where you find abundant marine life, the most desired being the **spiny lobster** *(Panulirus hormarus)* and the **brown mussel** *(Perna indicus)*.

In Lakshadweep: Ten of the islands of the Lakshadweep archipelago are inhabited. The lagoons in these islands are relatively shallow and the largest is in Minicoy. Luxuriant growth of branching and massive corals such as species of Acropora, Montipora, Pocillopora and Porites, along with associated fish and invertebrates occur in the reefs. The one item most sought after in the lagoons is bait fish, some 60 or so species used for attracting the skipjack and young yellowfin tuna. The reefs also support spiny lobsters and a good many species of fish. A few miles to the north of Kavaratti Island lies Pitti Island, which is among the very few rookeries for sea birds in India. Both the sooty tern and the noddy tern breed on this tiny island of about 7.5 acres (3 hectares). A number of other species of sea birds also congregate here.

Mangrove swamps harbor a range of facinating life.

The **green turtle** (*Chelonia mydas*) is known to nest at Suhuli Parr, Pitti Island and Minicoy Island. It is at this southernmost island in the Lakshadweep that *mas* – a cured smoked and dried product that is a must with every meal for the islanders – is made from the tuna meat. The once ornate sail fishing boats of Minicoy known as *odams* are now almost a thing of the past, having been replaced by mechanized boats fitted with a bait well for carrying live bait fish for rod and line fishing for tuna.

Mannar: Krusadai Island in the Gulf of Mannar is an important center for students of marine biology from all over the country. The island now comes within the delineated area of the National Marine Park in the Gulf of Mannar, covering a chain of 21 islands from Rameswaram to Tuticorin. The park has been established with a view to conserving the fringing coral reef and sea grass ecosystems from further human interference and giving adequate protection to the **dugong** or **sea cow** *(Dugong dugon)*, **sea turtles** and other vulnerable and endangered species, including the unique **enteropneustan** or **acorn worm** *(Ptycodera flava)* occurring in Krusadai.

South of this, off Tuticorin, are the pearl banks of *parrs* and conch beds. Prior to the mid-1960s, a number of pearl fisheries were conducted from time to time in the Gulf of Mannar, the pearl oyster being *Pinctada fucata*. A falling number of oysters in the *parrs* has resulted in the failure of this fishery since the 1960s.

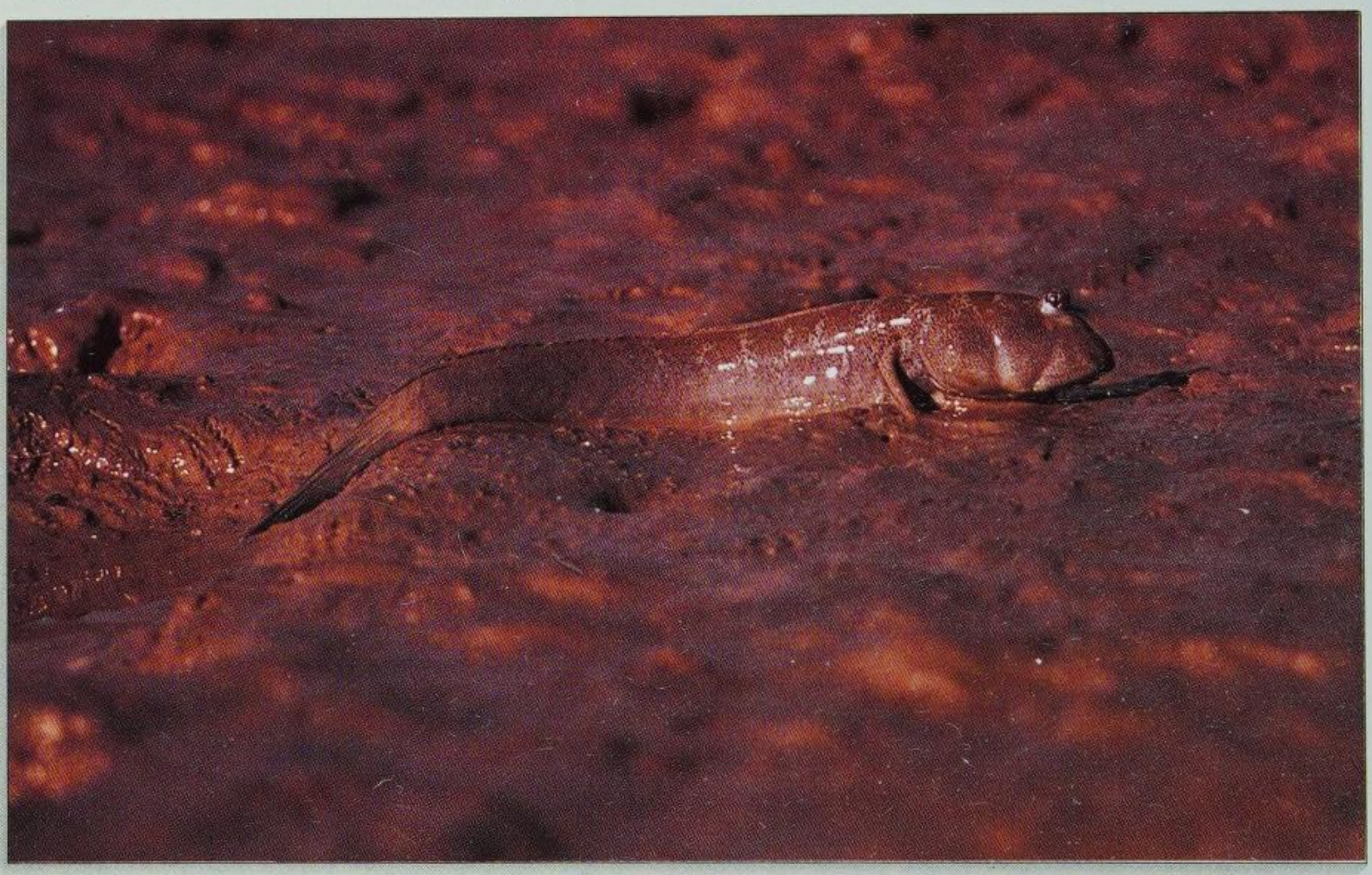
The **conch** *(Xancus pyrum)* is also known as the sacred conch on account of its use in religious ceremonies. Skin diving is used for collecting conch in depths up to 65 ft (20 meters) from November to mid-May in the Gulf of Mannar and June to October in Palk Bay with the search always on for the rare **sinistral shell** *(Valampuri chanku)*, which is considered priceless.

Seaweeds: The Mandapam-Rameswaram coasts are rich in seaweeds but the natural beds are being rapidly depleted to meet industrial demands. A number of *Agrophytes* (species of *Gracelaria*, *Gelidiella* and *Hypnea*), and *Alignophytes* (species of *Sargassum* and *Turbinaria*) occur in the area. It is a common sight to see a few hundred men, women and children collecting seaweeds from the intertidal and shallow areas in and around this chain of islands for supplying to the seaweed processing industries in the hinterland and other parts of the country.

Dugong and whale: The **dugong** is the most endangered of India's marine animals. The residual population of this herbivore in the Gulf of Mannar and Palk Bay is very vulnerable. Excessive and

unregulated fishing with mechanized boats and canoes resulting in incidental capture, injuries due to boat hits and various methods of illegal take have drastically depleted the population. At the turn of the 20th century they were so abundant in the area that there used to be regular organized herding and spear fishing for them. They are closely associated with the sea grass ecosystem in the shallow sub-littoral and intertidal areas where beds of *Halophila ovalis*, *Zostera sp.* and *Cymodacea spp.* occur.

It is today a rare event to see a dugong in the foraging grounds or in the open water around the islands. They move individually or in small groups, with the calf riding on the cow while submerged. Every three or four minutes they come up to the surface to breathe, normally in a horizontal position, but when curious about a floating object or



an approaching boat, or when there is wave action, they break the surface more vertically. The uprooted floating sea grass sticking to the dugong's head probably gave rise to the legends about mermaids.

Not far from here, in the Sri Lankan waters off Trincomalee is where the **blue whale** *(Balaenoptera musculus)* has been observed to calve. The stranding of **baleen whales** *(B. musculus, B. borealis)* and young and adult **sperm whales** *(Physeter macrocephalus)* in the Gulf, Palk Bay and along the Chennai coast indicate the proximity of the breeding grounds of these species, an area promising for whale watching.

Turtles: The world's largest aggregation or arribada of sea turtles takes place along the Gahirmata coast of Orissa where, in January or early February, over 300,000 **olive ridley** *(Lepidochelys olivaceus)* females emerge for nesting along a 6-mile (10-km) stretch of the beach within five to seven days. Access to this nesting beach, which forms the eastern fringe of Bitarkanya Sanctuary, is difficult. A second arribada of the same magnitude takes place at Gahirmata in March or early April. The hatchlings, in their millions, emerge after an incubation period of about 45 to 58 days, depending on the time of the arribada and the prevalent temperatures. A recent significant discovery is that turtle eggs developing above a pivotal temperature all turn out to be females and those below, males.

A headstarting program of olive ridley can be seen at Kovalam (earlier Covalong) 22 miles (35 km) south of Chennai (not to be confused with the place of the same name in Kerala) where due to heavy egg predation by man and wild animals, freshly laid clutches of eggs of the olive ridley are transplanted to hatcheries and the hatchlings released on the same beach.

All five species of sea turtles are on the endangered list. Several stretches of the beaches along the mainland coast and Andaman-Nicobar and Lakshadweep have been identified as nesting sites of the **green turtle** *(Chelonia mydas)*, the **hawksbill** *(Erethmochelys imbricata)*, the **leathery turtle** *(Demochelys coreacea)* and the olive ridley, with very little known about the **loggerhead** *(Caretta caretta)*.

Plankton blooms and noxious animals: A major feature along the west coast of India is the very

large-scale blooms of the nitrogen-fixing blue-green algae *(Trichodesmium erythreum)* from February to May. No deleterious effects are noticed. On the other hand, "red tides" caused by the dinoflagellate *(Notiluca miliaris)* results in fish mortality. Still more dangerous are blooms of *Hornellia marina*, another highly toxic dinoflagellate, which are seen at the onset of the monsoon along the Kerala coast, causing mortality of fish, crustaceans and other invertebrates.

In treading in the lagoons of the Lakshadweep one has to be careful not to step on the spines of the well-camouflaged **stone fish** or to handle the beautiful **scorpion fish**, the spines of which are venomous and injury from which could be excruciatingly painful.

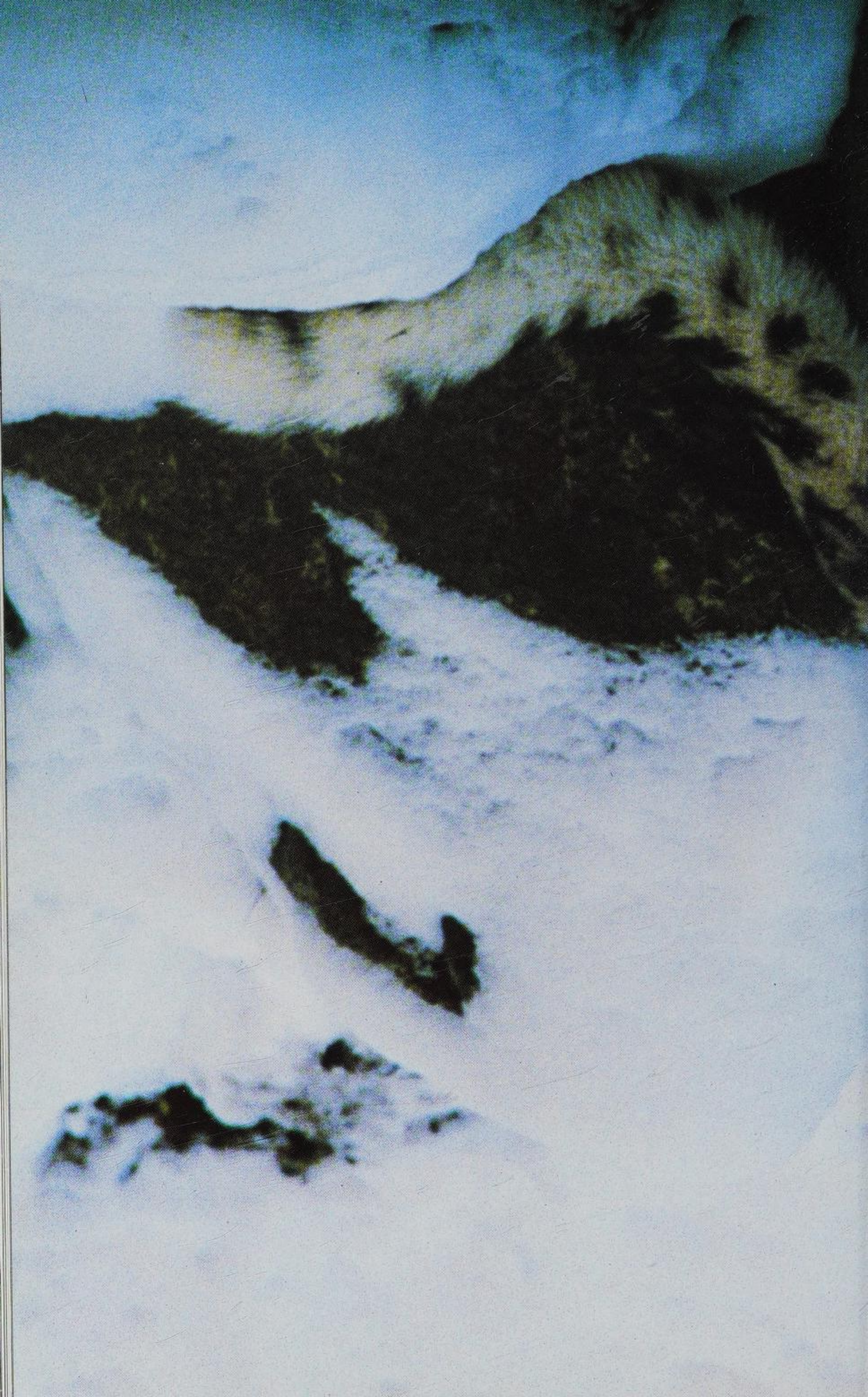
Among the coelenterates, the sting of the nematocysts of *Physalia physalis*, commonly known as the Portuguese Man-o'-War could even be fatal. *Physalia* occurs along the east coast with the commencement of the northeast monsoon. *Porpita porpita* and *Vellela vellela*, two chondrophorans that immobilize prey organisms with their stinging cells, are closely associated as commensals with young fish. Among corals, the sting from the polyps of *Millipora* is said to be very painful.

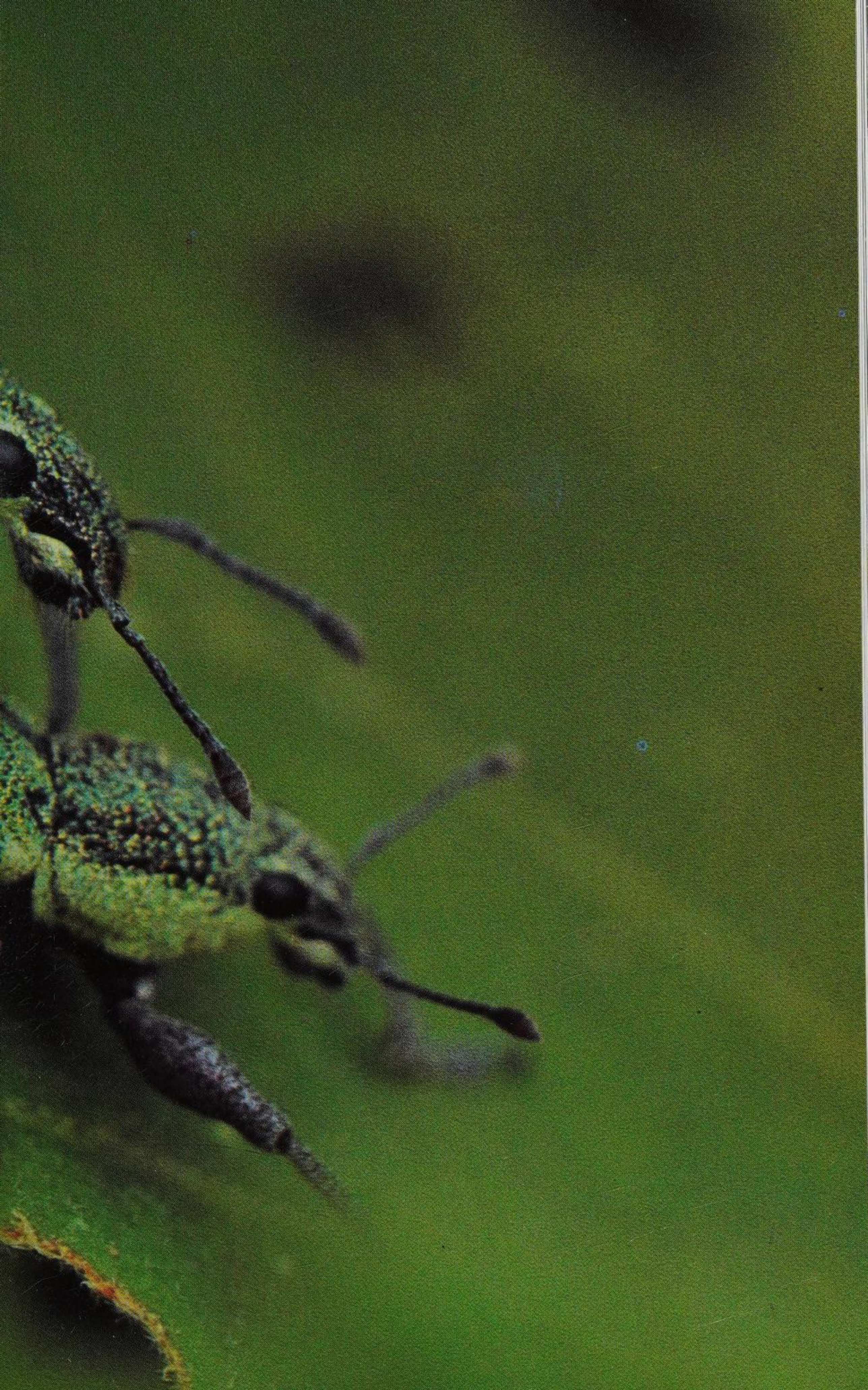
The whale shark: The largest of all fishes, namely the passive **whale shark** *(Rhineodon typus)*, growing to a length of 40 ft (12 meters) or so is a visitor to the Indian coastal waters and, to date, the largest number of captures of this giant shark has been along the Gujarat coast where it is harpooned or caught in gill nets for its liver oil, the carcass being discarded. The wholesale slaughter, often in a most barbaric fashion, of sharks of all descriptions along the Indian coast is causing great alarm among conservationists.

Game fish: Large fish, often very spectacular, which have been widely hunted for their flesh also occur in Indian waters. Important species incude: **tuna**, **seerfish**, **wahoo**, **marlin**, **swordfish**, **sailfish**, **barracuda**, **dolphinfish**, **rainbow runner**, **telang queenfish**, **pelagic shark** and many others. They can be observed in most areas along the west coast of India (Ratnagiri, Goa, Karwar, Cochin), in the Gulf of Mannar (Tuticorin, Mandapam), the Lakshadweep sea and the Andaman and Nicobar Islands.

Left, the mudskipper, an amphibious fish, is found amongst mangrove swamps and above, a Neptune crab.

Mangrove: The estimates are that there are nearly 1 million acres (405,000 hectares) of mangrove forests along India's coasts, the most important being the Sunderbans in West Bengal. While large areas have already been denuded of mangrove for conversion to agricultural land, human settlement, industries, salt production and other uses, an awareness has grown concerning the need for conservation and management of this resource. Mangrove waters get greatly enriched with nutrients and act as an important nursery for many species of marine animals that later return to the sea for maturing and breeding. Some, like the much sought-after **Indian shad** *(Hilsa ilisha)* in West Bengal, enter the estuaries for breeding in freshwater.





PARKS AND SANCTUARIES

The concept of the unity of all life, and its roots in and dependence on the environment, is an ancient one in South Asia. *All* life is deemed sacred, each creature has its place and function in nature's mosaic. This view lay at the root of the advocacy of compassion for all living creatures and *ahimsa* (non-violence) preached by the Buddha and Mahavira.

It was as early as in the 3rd-century BC that Emperor Ashoka issued his edicts, which included injunctions concerning human behavior towards animals, and set up sanctuaries for wild animals. This designation of areas as protected is perhaps the first such governmental decree on record anywhere. But even before this, in Vedic literature of a thousand years earlier, there is mention of sacred groves in which life was protected. The Buddha himself preached his first sermon in a Deer Park near Sarnath, a place some miles away from Varanasi.

With the passage of the centuries, much of the strength of this tradition was, in practice, lost, though the percepts were never wholly forgotten. In more recent years, it was, paradoxically, the hunters, the *shikaris* of the subcontinent, who played a major role in the preservation of forests and wildlife. It was essentially for sport that the Mughal emperors declared large tracts of forest as reserves. Both prior to and during British rule, other princes did the same in territories they controlled: the "Princely States" that were permitted to survive under British control and protection. Many enlightened British administrators in India who started as *shikaris* turned into pioneer conservationists and earnest naturalists, as did many Indian *shikaris*.

The years of World War II and those that immediately followed brought devastation, at an ever increasing rate, to the region's forests and wildlife. To the insistent clang of alarm bells and pressure from public opinion, led by informed and active conservationists, generally sympathetic (though, in this respect, not always effective) governments have established national parks and sanctuaries all over the region (India alone now has over 70 national Parks and 410 Sanctuaries). Thanks to these, many species that would otherwise have disappeared by the end of the 20th century have been assured a future and a number are thriving again in parks and sanctuaries in which habitats favorable to them have been preserved and even, in some cases, extended by reclamation.

It is a selection of these parks and sanctuaries and what can be seen in them that is presented in the pages that follow. The variety is fascinatingly rich and the settings are among the most beautiful to be seen anywhere. In view of shared characteristics, Indian and Nepali sites have been grouped together, while Sri Lankan sites have been placed in a separate section owing to certain special features to be seen there.

What the visitor will find most heartening is that these parks and sanctuaries have been set up and are being extended in countries where pressures of human population growth are being most severely felt, where only by conscious self-restraint and self-denial can the temptation to plunder nature's unguarded treasures for immediate and urgent need, be resisted. Serious lapses, unfortunately, still occur, but it is being increasingly realized that shortsightedness in such matters would, in the not too distant future, bring disaster to both humans and animals alike.

Preceding pages: Sagarmatha National Park; the extremely rare and elusive snow leopard; winter morning on a North Indian river; the region boasts a spectacular range of insects. Left, returning the compliment.

DACHIGAM NATIONAL PARK

The entry point into this wildlife reserve, one of India's most scenically beautiful, is only 14 miles (22 km) from Srinagar. First protected in 1910, this mountainous area forms almost half of the Dal Lake's catchment area and its importance in supplying Srinagar with pure drinking water was recognized by the then Maharaja of Jammu and Kashmir who initiated steps for the preservation of this environment. Maintaining the well-wooded and grassy slopes of this catchment area ensures a minimum of erosion and that the waters that feed the city are almost as clear and clean as in the Marsar Lake from which they flow. The area was also protected as a hunting preserve by the Maharaja. It was declared a sanctuary after India became independent and was upgraded to National Park status in 1981. Between 1910 and 1934, 10 villages were relocated outside the boundaries of the reserve, hence the name *dachi-gam*, a word which translates "10 villages."

Within its two sectors, Lower and Upper Dachigam, spread over 55 sq miles (140 sq km), it incorporates a variety of vegetational types – riverain forest, grassland, broad-leaved woodland, coniferous forest, bare-rock faces and alpine pastures and scrub – spanning heights ranging from 5,500 to 14,000 ft (1,700–4,300 meters) above sea level. Two ridges rise steeply on either side of the park, forming a natural boundary encircling an area of great topographic variety – deep gullies and wooded slopes, huge rocky outcrops and sloping grasslands. On the northern ridge rises the Mahadev peak (13,011 ft/3,966 meters). The interlocking valleys continue into Upper Dachigam where, amidst 14,000-ft (4,300-meter) ridges, nestles Marsar Lake, from which flows the Dagwan river. The park's only road, part metaled, part jeep track, runs 6 miles (10 km) through the Numbal Beat of Lower Dachigam, along the main valley of the tumbling clear trout waters of the Dagwan river.

Home of the Hangul: The Dachigam area has been protected to preserve its unique Himalayan range of flora and fauna. Paramount among the latter is the **hangul** or **Kashmir stag** *(Cervus elaphus hanglu)*, one of the most endangered species of red deer in the world. Dachigam is now the only place in the world with a viable hangul population. Though its decline was mainly the result of poaching, its home also suffered from other harmful forces; the presence of a large number of grazers bringing thousands of sheep, buffaloes and goats to feed on the lush high pastures of Upper Dachigam. The area was overgrazed and erosion was becoming apparent. Fanning this was the thinning of the birch and pine forests of these upper areas by the grazers who used the trees for building their summer homes and, in the lower areas, destruction of the forest by local inhabitants encroaching on the park for fuel and timber. To make matters worse, a Government sheep farm took a 4-sq-mile (10.5-sq-km) chunk out of the park's prime hangul habitat, adding to the upper area's summer grazing pressures, and endangering the south-facing grassland slopes of Lower Dachigam through intensive sheep grazing.

These are continuing problems for the Wildlife Department even today. But in the last decade they have been greatly reduced so that the hangul population has increased – a Government census in 1983 enumerated at least 500 individuals against an estimated 300 in 1954 – although there have been disturbing reports of wholesale slaughter of the animals by both the Indian security forces and Kashmiri militants. The sheep farm is now separated by a fence and the grazers, though not totally removed either, have been greatly reduced in number. More effective patrolling keeps poachers at bay and removers of forest produce to a minimum. Both the environment and the number of animals have thus greatly improved. However, at present the continuing unrest in the Kashmir Valley – which has also made the work of wildlife officials even more difficult – puts Dachigam effectively out of bounds to visitors.

A comprehensive appreciation of this undulating environment would ideally include exploration on foot along the tracks and animal paths that run along the valley floors and traverse the slopes and ridges. Every season in Dachigam has its characteristic beauty and interest; the flora present marked variations throughout the year and much of the fauna partake of local migration and also include several hibernating species.

Winter visitors: In winter, Upper Dachigam is inaccessible and even Lower Dachigam sees the temperature drop to as low as 14°F (-10°C) and between late November and early February may be shrouded in a thick blanket of snow. But it can present a stunning sight – a black and white scene of

Preceding pages, wild apricots in autumn, Kashmir. Left, gray langurs.

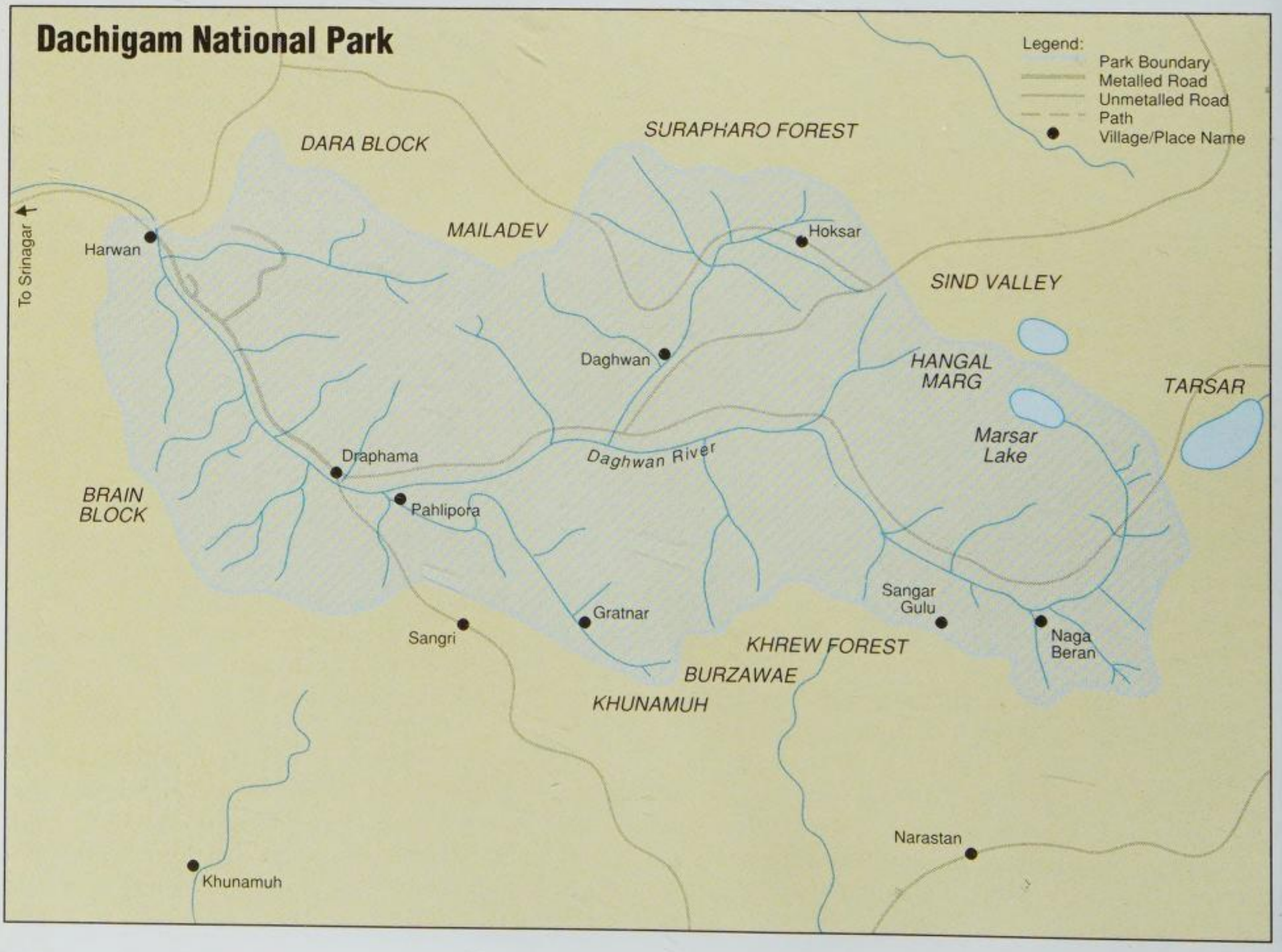
immense beauty and a stillness that accentuates the few forest sounds. High-altitude bird species move to the lower valleys for winter feeding on the remaining seeds and berries, even those to be found in the old droppings of other creatures. Flocks of **cinnamon sparrows** appear and the **black and yellow grosbeak** presents a startling splash of color against the white backdrop. Its clear call rings through the air, mingling with the chattering of the **black bulbuls**, a vociferous species in winter abundance. Even the **monal pheasant**, the male splendidly multicolored, may be seen at this time in the lower valleys. Winter with its lack of camouflaging foliage is one of the best times to view hangul. They congregate in large mixed herds in the shelter of the lower valleys where the park authorities have established mineral licks. In the harshest winter months, additional feeding is also put out and groups of 60 or more may be seen gathered there.

At this time too, one is likely to meet with large troops of **Himalayan gray langur**, an impressive long-coated subspecies of the black-faced gray langur *(Presbytis entellus)*, to be found over much of the subcontinent. Its winter diet consists largely of tree bark; its favorite trees, such as the poplar, being easily identified by the several dead branches that have become ring-barked from their gnawings.

The main predator in the park is the **leopard** (*Panthera pardus*). Though these are few in number and only rarely seen, winter is the time one is most likely to come across the carcass of a hangul that has succumbed to this carnivore, and from which many scavengers will also feed – **jackal**, **hill fox**, **yellow-throated marten** and **wild boar**. (Boar are not indigenous to the area, having been introduced from the Jammu region by a maharaja for hunting purposes. Unsuited to the harsh winter climate, they are dying out.) The **Himalayan griffon** and the **lammergeier** or **bearded vulture** are also lured by carcasses and the attractive **long-tailed blue magpie** will generally be found feeding also.

In the efforts necessary for successful foraging, winter is a time when one may meet with those smaller mammals, mainly nocturnal, that are otherwise extremely shy – **jungle cat**, **leopard cat**, **otter**, **Himalayan weasel**, may reward the silent and patient observer.

Spring and summer: By March the serene, harsh beauties of winter have given way to the richness of spring. As the leaves begin to sprout, the Himalayan langurs are quick to take advantage of the new source of food.



Messy feeders, they drop many half-eaten twigs and branches to the forest floor. Hangul will frequently be found associating with these monkeys, waiting eagerly beneath their tree to feed on these dropped morsels.

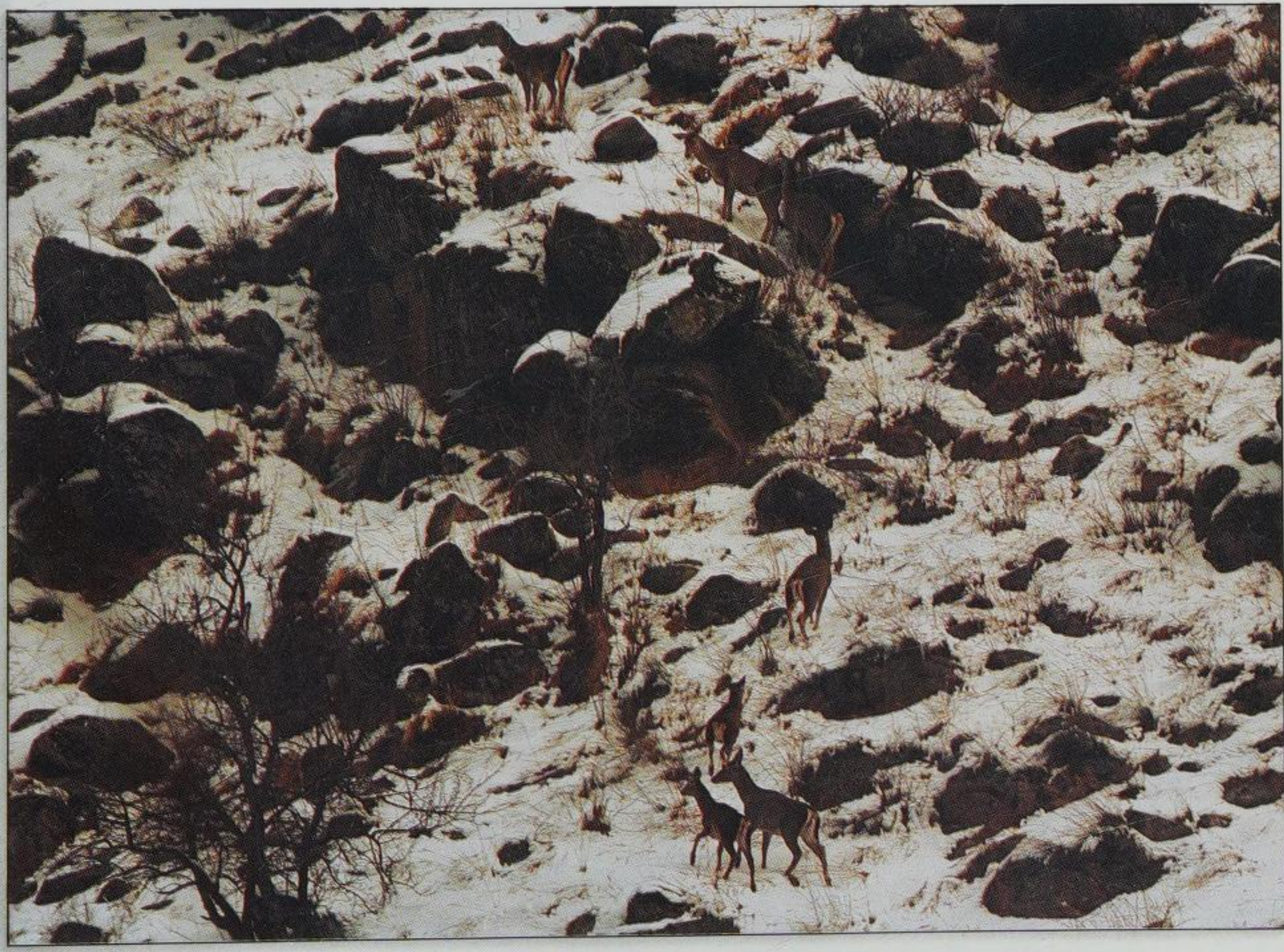
Another large mammal for which Dachigam is justly famous now makes its appearance – the **Himalayan black bear** (*Selenarctos thibetanus*). Having spent the winter hibernating in rocky shelters, it emerges hungry from its foodless sleep. Being omnivorous, it too will take advantage of a leopard kill, and in these first weeks many overturned stones lie along Dachigam's paths as testament to the bears' search for ants and other insects and grubs. As the trees come into leaf, the bears move into their branches which will provide the bulk of their diet for the rest of the year.

In spring the lower forest blossoms into a profusion of delicate hues. Wild cherry, pear, plum, peach, apple and apricot bloom white and pink amid the varying fresh greens of the new leaves. The main valley contains principally broad-leaved genera; oaks, elms, willows, and poplars will be found there, while the side valleys, locally called *nars*, become thick with the creamy flowers of the *Parrotiopsis jacquemontiana*, a shrub of the witch-hazel family, which is interspersed with trees of walnut and Indian horse-chestnut. The hill slopes turn green and the valleys dark under the thick canopy of developing leaves. The fruits begin to appear, much to the bears' delight.

Spring sees an appreciable change in birdlife too. The prominent winter species have disappeared to higher altitudes and others appear to feed on the new vegetation and begin their breeding cycles. The beautiful **golden oriole** suspends its cradle from a high branch. The **minivets** flash scarlet and yellow as they move in noisy feeding parties with the **tits**, **warblers** and **finches**. Tree holes often house **pygmy owlets** and **woodpeckers**, most conspicuous amongst which is the **Himalayan pied woodpecker**, a smart black and white bird with red vent and, in the male, matching red cap. Among the lower-level shrubs and grasses hop the **babblers**, **buntings** and **laughing thrushes**, the **streaked laughing thrush** being one of the most commonly seen birds of Lower Dachigam.

The lower forests now lose the langurs as they move with spring to higher valleys. The male hangul are on their way up too, dropping their antlers and beginning the new growths encased in "velvet." The females remain longer and give birth to their calves

Hangul.



in the long grass of the lower slopes in May and June. The young are spotted and well-camouflaged for their early days when the hinds leave them hidden and alone, returning only periodically to feed them. This is the time the black bear turns predator – they can be seen crisscrossing the steep slopes in their search for the defenseless newborns. But after the first couple of weeks the main danger is over, since the calves can now outrun any would-be predatory bear. The calves then stay with their mothers, moving upwards to the high pastures of the park once the snows have receded.

The Upper Reaches: Winter remains late at these altitudes and comes early, but during the few summer months Upper Dachigam presents truly glorious views - vast rolling meadows, splashing clear streams, waterfalls, silver birch stands, deep azure skies and high snow-dotted ridges combine in delightful harmony. Comparable to the famous Valley of Flowers in the Garhwal in Uttar Pradesh, the green summer grass of these highland meadows is all but eclipsed by the immense array of alpine flowers dispersed in it – crimsons, golds and purples are the ground carpet's dominant colors while more detailed patterns are picked out in blues, reds, orange and other more subtle hues. The delicately colored blue poppy is here and a number of medicinal plants like *Saussurea sp.*, as well as other representatives of the rarer Himalayan flora, are to be found.

The change in elevation brings a new variety of birds – the **red-browed finch** is an attractive one to look for in the birch forests. Higher still, above the tree line, **redstarts**, **wagtails** and the **Himalayan rubythroat** can be seen hopping among the rocks edging Marsar Lake. Alpine accentors are here and the **wall creeper** with its characteristic butterfly-like flight.

The park's higher altitudes still harbor a few **Himalayan brown bear** *(Ursus arctos isabellinus)*, endangered and rare throughout its range.

The brown bear is an inhabitant of the rolling uplands; ecologically separated from the forest-dwelling black bear, in Dachigam their ranges overlap. However, the brown bear's exact status is uncertain and few sightings occur. By contrast, the other hibernating mammal of these upper reaches, the **long-tailed marmot** (*Marmota caudata*), is both visible and very audible. These endearing rodents of the squirrel family have their burrows on the treeless grassy slopes and their high-pitched whistling screams echo against the ridge walls. Feeding and scurrying

Yellow-billed blue magpie.

among the many boulders at the stream's edge, if disturbed by the call of a soaring chough or sight of an intruding human, they stop to perch up on their haunches, thus enhancing their field of vision.

Traditionally, Upper Dachigam provided important grazing for the hangul and large-scale summer migrations there were recorded. However, Dr Fred Kurt who studied the hangul in Dachigam for several years found almost no evidence of their presence in Upper Dachigam and had to conclude the "human interference led to considerable loss of the former range and that the present range is restricted to Lower Dachigam." Besides this effect on the hangul the presence of the Banjaris, Bukarwals and Gujjars, with their herds of livestock, had a deleterious effect on the environment.

In spite of these warnings, the number of livestock head increased in the 1970s to an estimated 10,000. In 1977 this caused such pollution in the Dagwan river that the waters could no longer be collected. In the following year, the number of grazers was drastically reduced and grazing restricted to a limited number of valleys in Upper Dachigam. This is presently the official version of the situation. The result of the action had been a return of the hangul to some of their summer haunts – although it is increasingly hard to enforce these wildlife directives as the conflict in Kashmir escalates and the grazers have probably returned.

Summer passes quickly in these high valleys and by late August the first frost and flurries of snow appear to herald winter's return. Hibernating animals feed up quickly before their long winter sleep, while other fauna move once again to the protection of the lower altitudes.

Autumn sightings: Autumn in Lower Dachigam presents another blaze of color as the leaves change shades to reds, golds, yellows and various hues of orange. The different species are easily distinguishable then in their varied tones with the majestic chinar towering above the others and last to retain a stately burnt-orange beauty before the bareness of winter.

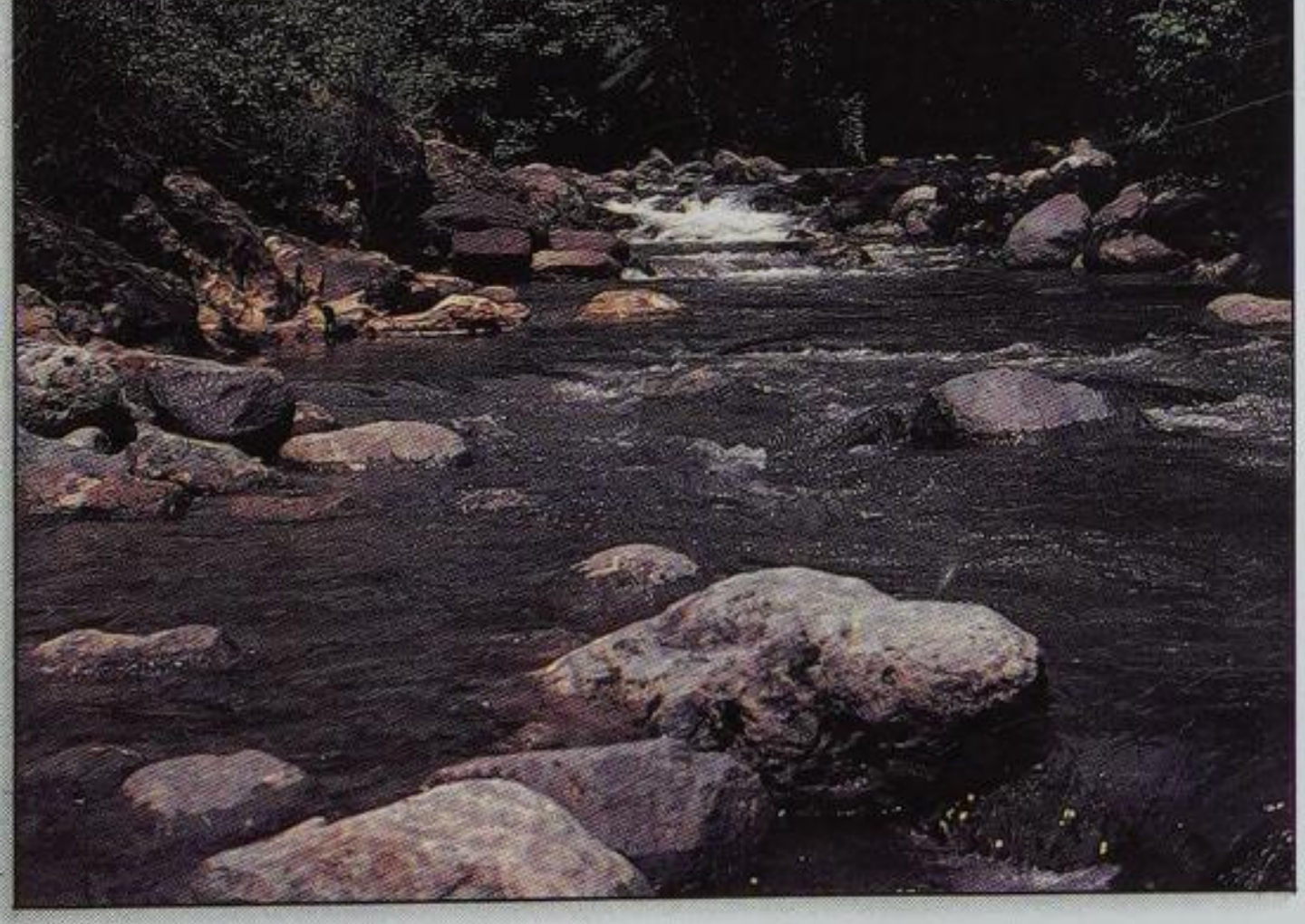
October is the main rutting month for the hangul and the lower valleys reverberate with the deep roaring calls of the stags. With full-grown antlers now clean of "velvet," the stags look their impressive best. A full-grown male will carry a head of 10 or 12 points, though occasionally more may be counted.

The bears are feasting on walnuts and acorns, laying on fat to tide them through the coming winter. Soon the monkeys and grosbeaks will again be in evidence – a sure indication that the circle of seasons has again turned fully to winter.

Being so close to Srinagar, the state's capital city, Dachigam, unlike the majority of the subcontinent's parks and sanctuaries, lent itself admirably to those with only a day or two to spare. Even such a brief visit was worthwhile. A stroll along the flat paths of the **Numbal Beat** of Lower Dachigam, accompanied by one of the Wildlife Department staff, was as rewarding for viewing wildlife as any of the more strenuous routes. It is hoped that it will soon be possible to visit the park again – it is *strongly* advised that you do not travel to Kashmir at this time.

Other places to explore include some of the lower *nars* ; **Drognar** and **Munyu**, side by side, leading north from the jeep track, may be particularly rewarding in the late spring as these are favorite calving areas of the hangul and therefore may afford a view of the heavily spotted young. The rare **serow** can be seen here.

Trekking and camping equipment would be essential for a trip to Upper Dachigam, although within the park some shelters used to be available in the **Sangargulu Valley** of Upper Dachigam and at **Gretnar**, several thousand feet lower, where the **koklas pheasant** resides.



Dagwan river.

CORBETT NATIONAL PARK

Just short of 300 km northeast of Delhi, cradled in the foothills of the Himalaya lies the **Corbett National Park.** It is India's first national park and also one of her finest.

This park has quite a history. Long ago, on the banks of the river Ramganga, there lived a flourishing community. Today, some evidence of their culture is found in fragments of terra-cotta and the remains of their temples along the river. This community lived by clearing some of the forest in the *duns* (valleys) and had to fight a constant battle to keep their farmlands free from the invading jungle.

The first in a series: The 40 years following the arrival of the British in this area in 1820 were disastrous. Trees were felled mercilessly for timber and these virgin forests were devastated. It was a Major Ramsay who took the first real systematic measures which, in years to follow, were to restore the forests to their former health. Cattle stations were removed, cultivation was stopped, a fire-fighting force was established and, most important, the removal of timber without a license was totally prohibited. Then, in 1907, the possibility of creating a game sanctuary in this area was first mooted, but was rejected outright. Two forest officers, E.R. Stevens and his successor, E.A. Smythies, were to take up this cause again. However, it was only later, when Smythies was a conservator that he consulted Major Jim Corbett who knew this area well, regarding the possible boundaries for a proposed national park.

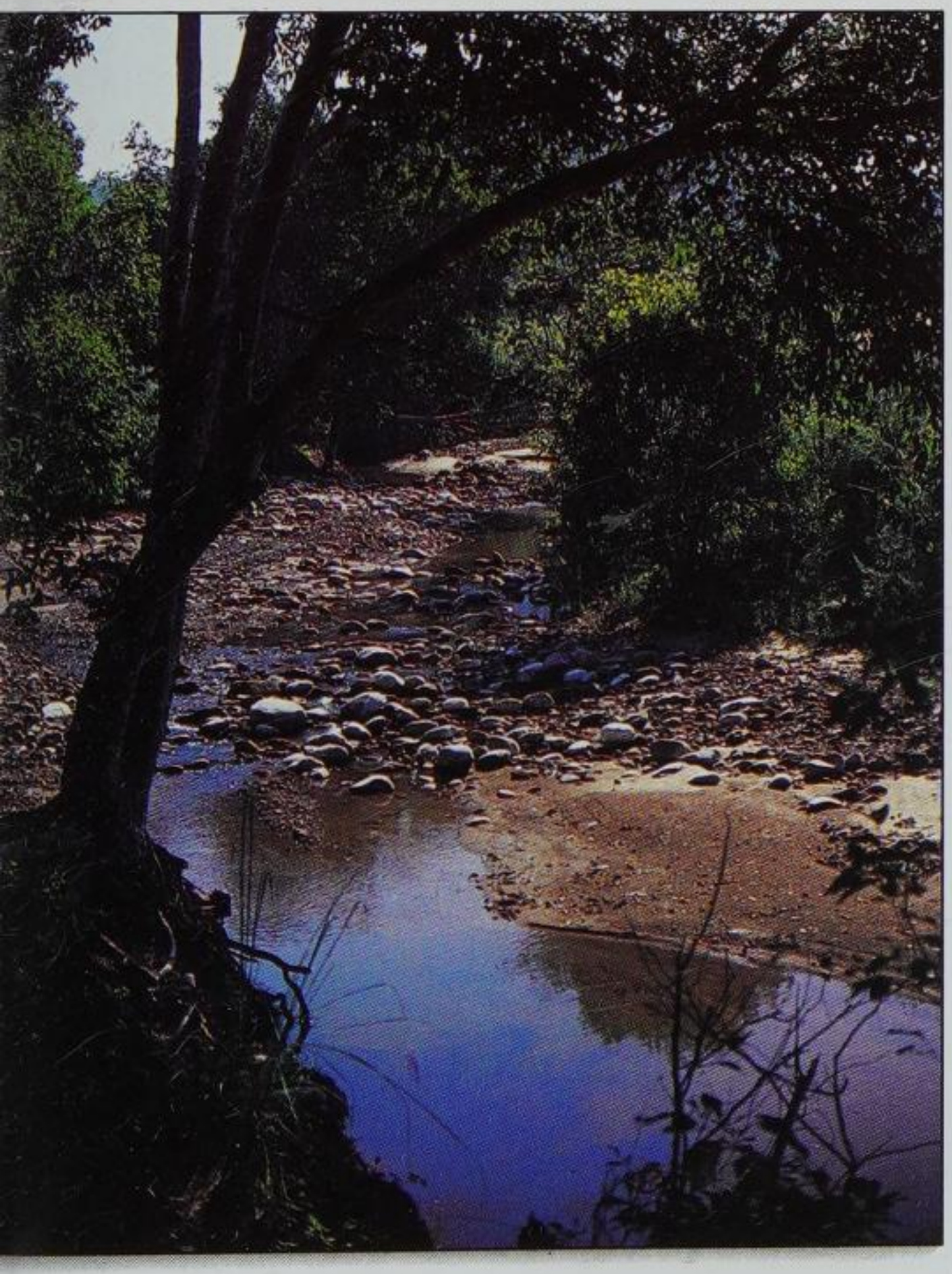
During the 1930s, tiger shooting was in vogue and many viceroys, governor-generals and other dignitaries visited this area – the famous *terai* and *bhabar* tracts of then United Provinces – to kill tigers from elephant-back and high *machans* in elaborate *tamashas* (entertainments): tiger shoots. However, in a strange twist, it was through the efforts of other hunters, who abhorred this form of sport and massacre, that Sir Malcolm Hailey, then Governor of the United Provinces, keenly accepted the recommendation that an area of 99.07 sq miles (256.59 sq km) be set aside for the park. (This is a welcome case of poachers turned gamekeepers.) Thus, on August 8, 1936, the Hailey National Park, the first in India, was established.

Tribute to an enlightened hunter: In 1952, a few years after India attained independence, the park's name was changed to Ramganga National Park, after the life-giving Ramganga river that flows through almost the whole length of it. In 1957, it was renamed once more, Corbett National Park, in honor and memory of the late Jim Corbett, the legendary hunter-naturalist turned author and photographer who helped in demarcating the park's boundaries and setting it up. It was in this area that he had shot the "maneaters" who had been carrying off local villagers, the notorious Kanda Maneater being one of them. His books on these thrilling, if somewhat gung-ho, adventures, *The Maneaters of Kumaon* and *The Maneating Leopard of Rudraprayag*, are perennial best-sellers, well known all over the world.

Perhaps the real hero was the man who had influenced Jim Corbett most to hang up his guns and take to the camera, a forest officer called F.W. Champion, the pioneer of wildlife photography in India. His photographic masterpieces, *With a Camera in Tiger-land* and *The Jungle in Sunlight and Shadow*, were photographed and written in these very same jungles.

In the late 1960s and the early 1970s, the world was hit by the awareness that the Indian tiger *(Panthera tigris tigris)* was on

Preceding pages, early morning, Corbett National Park. Left, great horned owl and below, a jungle stream.

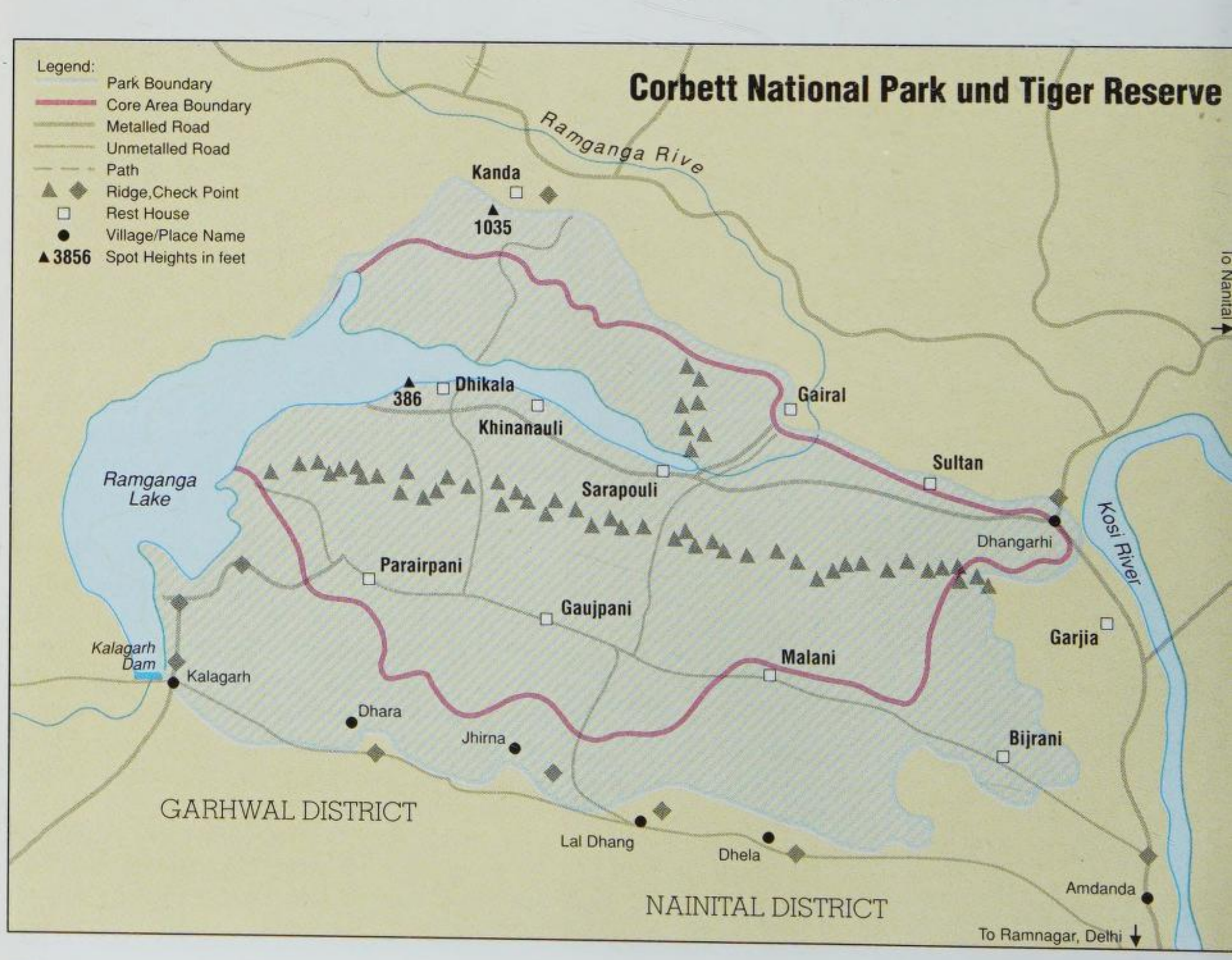


the brink of extinction and that of an estimated 40,000 at the turn of the century, less than 2,000 survived in the wild. A far reaching project was envisaged. Its philosophy was that, if the tiger and its habitat were totally protected in tiger reserves, then other species of fauna and flora too would flourish as nature would maintain her own balance. Thus, with the help of the World Wildlife Fund, Project Tiger was launched at Dhikala in the Corbett National Park on Apr. 1, 1973. This National Park was one of the first tiger reserves along with seven others in the country; today, there are 23 such reserves. After initial gains (up to 4,000 tigers were recorded in 1984) the present-day population has dropped, under pressure from poaching and the continuing damage done to India's forest cover, to under 2,500.

Topography: The Corbett National Park or just "Corbett" as it is also popularly known is situated in the hilly districts of Pauri Garhwal and Nainital of the northern state of Uttar Pradesh. It lies between latitude 29° 13' North and 29° 35' North and longitude 78° 33' East and 78° 46' East. The park comprises an area of 201 sq miles, (520.6 sq km). Of this, an area of 123.5 sq miles (320 sq km) is the core – the *sanctum sanctorum*, where no kind of disturbance is permitted. There is a move to expand the park by another 425 sq miles (1,100 sq km). However, so far only an area of 116 sq miles (300 sq km) is to be added to the northern area of the park. A buffer zone of 348 sq. miles (900 sq. km) is also planned. These expansions are keenly sought after by conservationists as it will link the park with other forests through corridors. This is important to help the overflow of animals to level out, prevent inbreeding and ensure that viable gene pools are maintained.

The area in the Himalayan foothills in which the park is situated is known as the South Patlidun. In elevation the park ranges between 1,312 ft (400 meters) at its lowest to 3,970 ft (1,210 meters) at its highest. Corbett is, in fact, a large valley with its long axis from east to west. Through this valley run three thickly forested ridge systems roughly parallel to one another and in the same direction. Small offshoots of these ridges run north to south and the valleys formed in between are known as *sots*. The ridge to the north forms the boundary of the park in that direction and Kanda, the highest point, with its magnificent panoramic view of the park is here.

Between the northern ridge and the longer median ridge, is the Ramganga river, which



enters the park from the northeast, flows through the park into the reservoir and makes its exit at Kalagarh towards the southwest. The southern ridge is a bit lower and this area of the park is drier and is notable for its more deciduous type of vegetation and its own rugged charm.

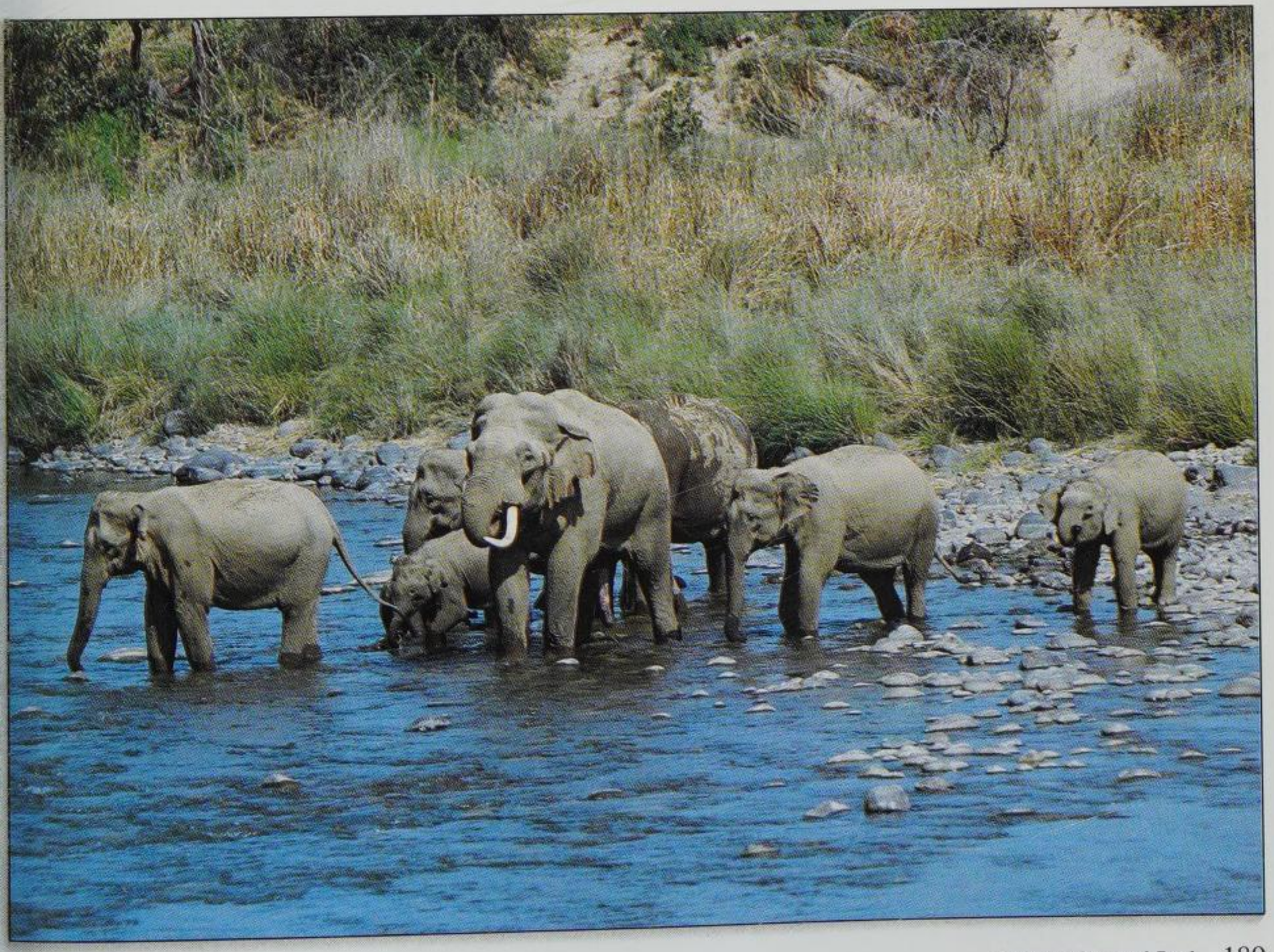
A topographic change of significance that took place in the park was the inundation of 16 sq miles (42 sq km) of prime habitat when almost a tenth of the park's area was lost to the waters of a multipurpose hydroelectric dam at Kalagarh. This is the largest earthern dam in Asia and lies at the southwestern fringe of Corbett. The construction of the dam certainly was not in the best interest of the park. Conservationists had feared that the changes that would come with such a dam would bring about adverse effects but the changes by and large have been absorbed by the remarkable resilience of nature.

The waters first started to fill up in 1974. In 1976, when they had inundated a greater part of the reservoir, the elephant migration routes linking the park with the western and northwestern reserved forests were cut off. Not for long though. Those great, accomplished surveyors of gradients and trail-blazers soon established other routes.

There was a shift of animals from the affected areas to higher ground. There will also be changes that are less apparent at this stage and though some research has been done, much more is needed and is planned to study these changes in detail. The lake, besides just its scenic charm, has added to the park in a few ways. A large number of species of water birds, both migrants and others, have begun to frequent its waters, though mainly in winter. Crocodiles – both the long-snouted, fish-eating **gharial** (*Gavialis gangeticus*) and the **mugger** (*Crocodylus palustris*) have found new homes here and their numbers have increased. They can often be seen sunning themselves on the sand banks. Sporting fish such as the **mahseer** (*Barbustor*) and **malce** (*Wallago attu*), abound in the lake and in the river.

Flora and climate: Vegetation in the park is confined chiefiy to the bhabar tract type of the Siwalik hills; different kinds of vegetation are found all along the varied topography, which comprises hilly and riverain areas, temporary marshy depressions, plateaus and ravines. The park is known for its almost pure sal (*Shorea robusta*) stands in the lower hilly ridges and flat valleys. Some associates of sal here are haldu (*Adira cordifolia*), rohini (*Mallotus philippinensis*), and karipak (*Murraya konigi*).

Elephants bathing in the Ramganga river.



The riverain area is clothed in shisham (*Dalbergia sissoo*), khair (*Acacia catechu*) and others. In early summer it's an unforgettable sight to witness the soothing green of the shisham islands in new leaf.

On the higher ridges we find bakli (*Anogeissus latifolia*) which enriches the hues of the park with its reddish leaves and pale bark. The chir *(Pinus roxburghii)*, anauri *(Legestroemia paruiflora)*, and gurail *(Bauhinia racemosa)* are some others that find root-holds at these contours, along with bamboos. The common shrub is *Clerodendrum viscasum* and a weed which is causing some concern is the lantana.

The *chaurs*, the savannah grasslands, are covered with a variety of grasses like *Themeda arundinacea*, Vetiveria zizanioides and *Thysanulena maxima.*

A hundred and ten species of trees, 51 species of shrubs and over 33 species of bamboo and grass are found here.

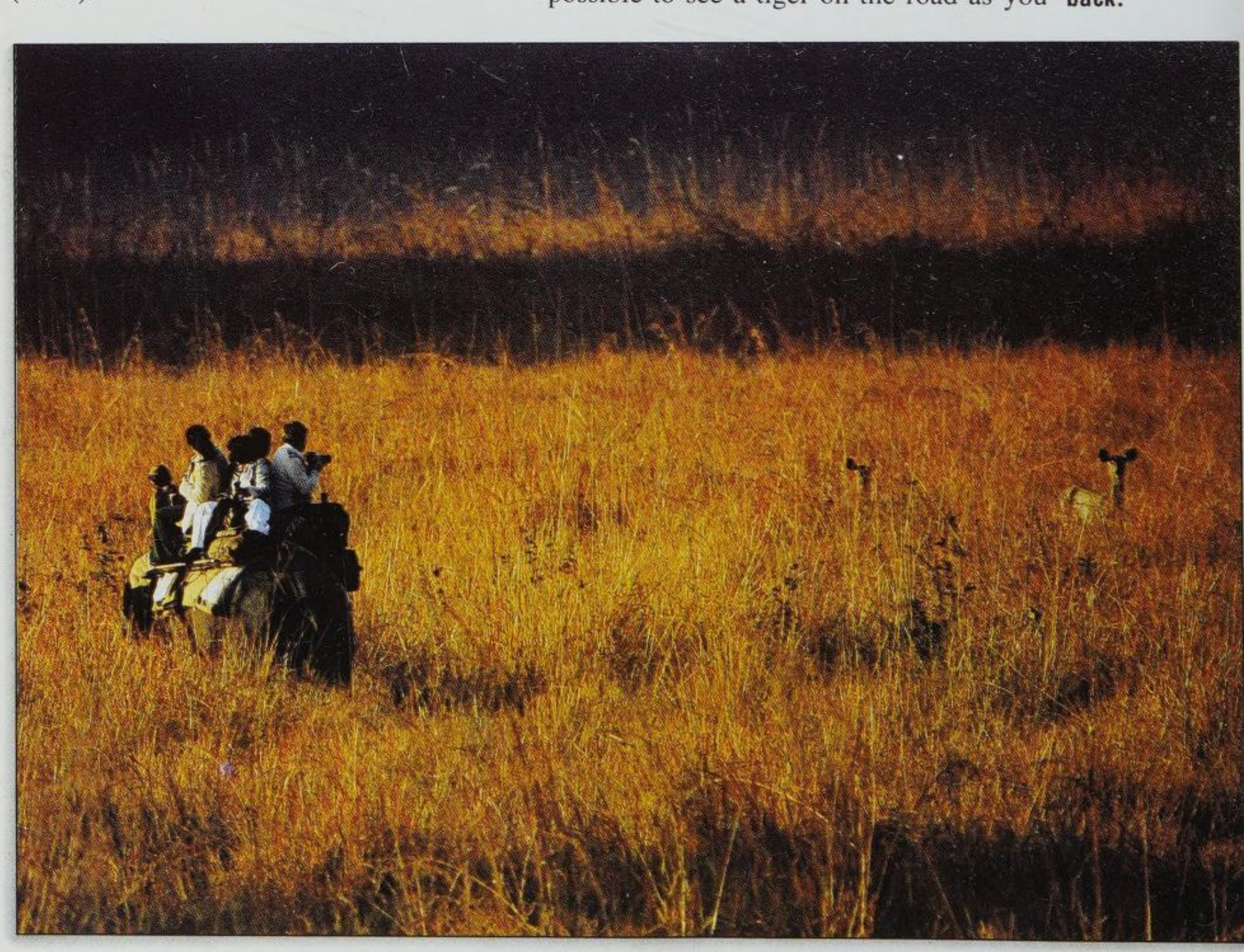
There are three distinct seasons in Corbett: *Cold* – November to February; *Hot* - March to June; *Rainy* (Monsoons) – July to October. In winter the nights are cold at an average of 41°F (5°C), with frost and some fog which lasts till late morning, but the sun is pleasant and the day temperature averages 77°F (25°C).

In the hot season, June is the hottest month, with day temperatures going up to an unbearable 112°F (44°C) but the nights are pleasant with an average temperature of 70°F (21°C). In the monsoon season, from June to October, the park remains closed to tourists.

There is very heavy rain, between 60 inches and 112 inches (1500 mm and 2800 mm). The roads are washed away by the heavy downpours and when the sun does shine the jungle steams with humidity. The animals move to the hilly areas of Corbett at this time for the cool breeze and to avoid the **daans**, a blood-sucking fly, which plagues them in the lowlands. Surely, these few months are times of a well deserved rest from the attentions of humans for the denizens of the jungle.

Rich variety: Over 50 mammal, 580 bird and 25 reptile species have been listed in Corbett. The insect life in itself is astounding and though not much work has been done in this respect even the layperson will be amazed at its abundance, mainly after the monsoon.

Corbett is well-known and a haven for its **tigers.** There is plentiful prey – four kinds of deer, wild boar and other lesser animals – for them to live on. With a bit of luck, it's possible to see a tiger on the road as you



Game-viewing from elephant back.

enter the park and travel down to Dhikala. Pug marks are seen in abundance on the roadsides, paths and animal trails. It's by tracing these pug marks, which bear individual characteristics, that the estimated population, which has shown a marked increase from 40 in 1972 to 90 tigers in 1984, and up to 128 in 1995, although poachers have been caught within the park itself.

Leopards (*Panthera pardus*) are found in the hilly areas of the park. They do sometimes venture into the lower jungles but at much risk to themselves from tigers. There have been many cases of leopards being killed and eaten by tigers. The leopard is, however, a great survivor and can sustain itself on even small birds and rodents.

The lesser cats such as the **leopard cat** *(Felis bengalensis horsfieldi)*, the **jungle cat** *(Felis chaus)*, the rare **fishing cat** *(Felis viverina)* and some others are found here, but being nocturnal are rarely seen. Civet cats that have been spotted in the park include the **Himalayan palm civet** and the **linsang** or **tiger civet**.

The **sloth bear** *(Melursus ursinus)* is found in the Bijrani-Malani areas of the park. It can be seen on the roadsides in the early morning or late evening, busily demolishing termite mounds for the grubs, or in the mahwa *(Madhura indica)* trees, relishing the sweet sticky flowers, which ferment in the hot season and are intoxicating.

The **Himalayan black bear** *(Selenarctos thibetanus)* is seen in the higher hills towards Kanda but only rarely and that too only during the cold winters.

The **dhole** *(Cuon alpinus)*, the wild dog, is also rare and seen in the southern areas of Corbett towards Bijrani. The **jackal** *(Canis aureus)* is commonly seen around all the campus areas. During the fawning season, jackals are most active and can be seen killing and carrying off newly dropped chital fawns.

The **yellow-throated marten** *(Martes flavicula flavicula)*, the **Himalayan palm civet** *(Paguma larvata grayi)*, the **Indian gray mongoose** *(Herpestes dwardsi)*, the **common otter** *(Lutra lutra monticola)* and the **blacknaped hare** *(Lepus nigricollis ruficaudatus)* are some of the smaller resident mammals. The **porcupine** *(Hystrix indica)* can also be seen at night near the garbage dumps of the park buildings at Dhikala.

Elephants *(Elephas maximus)* are one of the main attractions of Corbett. The whole jungle belongs to them. It is possible to see a herd or even a lone tusker crossing the road. Corbett's elephants by and large are

The park has a healthy tiger population.

well behaved, but one must always remember that, "Elephants have the right of way." The park's elephant population varies from about 200 to 300 and more in summer, when the sub-herds amalgamate and form large herds.

Of our four species of deer that are found here are the **chital** *(Axis axis)*, the well-known **spotted deer** and considered one of the most beautiful in the world. This is one of the chief prey animals of the carnivora. A smaller cousin of the chital, the **para** *(Axis porcinus)* is found in the more open grass-land and riverain areas. The sambar *(Cervus unicolor)* is the largest Asiatic deer and is sought after by the larger adult tigers of the park. The **kakkar** *(Muntiacus muntjak)*, also called the **barking deer**, is the smallest of the four. Nervous and shy, it warns the jungle's denizens of danger from predators with its hoarse, dog-like bark.

The goat-antelopes are represented by the **ghoral** *(Nemorhaedus goral)* in Corbett. Ghorals can be spotted on a drive up the hilly road to Kanda.

Wild boar *(Sus scrofa)* are found in the forests as well as in the grasslands, sometimes seen in sounders of 10 to 30 pigs. Even the tigers respect the large male boars. In encounters sometimes, tigers are known to have been killed by a large male wild boar.

The **langur** *(Presbytis entellus)* and the **rhesus** *(Macaca mulatta)* are well distributed throughout the park and also warn the jungle with their alarm calls, when they see either tiger or leopard from their tree-top perches.

Avian attractions: Corbett has many attractions for the bird watcher also. Over 580 species of birds are found here. Most of the water birds are migrants and arrive in winter. Some of these are the **greylag** and the **barheaded goose**, **ducks** of many kinds, and **great crested grebe**, **snipe**, **sandpiper**, **plover**, **gull** and **wagtail**. Some of the residents are **darters**, **cormorants**, **egrets**, **herons**, the **blacknecked stork** and the **spur-winged lapwing**. The commonly seen raptors in Corbett are the **osprey**, **crested serpent eagle**, **blackwinged kit**, **shikra**, **Pallas's fishing eagle**, **grayheaded fishing eagle**, **spotted eagle** and **harrier**.

Some of the other birds found in the forests are **minivets**, **shrikes**, **babblers**, **doves**, **drongos**, **cuckoos**, **parakeets**, **barbets**, 17 kinds of **woodpecker**, **thrushes**, **peafowl**, **kalij pheasants** and **red junglefowl** – the ancestor of all domestic fowl.

The rare **chir pheasant** is found in the higher hills near Kanda. The vultures commonly found are the **Indian white-**

Python swallowing a chital.

backed, **Himalayan longbilled** and the **king** or **black vulture**. On elephant rides, the mahouts keep a wary eye open for the circling vultures, now sadly dying out due to a mysterious virus, as they help pinpoint a carnivora's kill.

The nocturnal birds are the **nightjars**, **thich-knees**, **owls** and **owlets** and, by the river, the **great stone plover** and **stone curlew** hunt at night.

Reptiles: The Ramganga is the home of the descendants of the prehistoric reptiles, the gharial and the mugger. The gharial is the rare fish-eating, long-nosed crocodile, only just saved from extinction in the park through captive breeding and release to augment the few survivors there. Both the gharial and the mugger have been helped by the creation of the lake of the Kalagarh dam. A few species of **turtles** and **tortoises** are also found in and around the lake.

There are a wide variety of snakes in the park. As well as harmless varieties, the **Indian python**, **viper**, **cobra**, **krait** and **king cobra**, the largest of poisonous snakes, also inhabit Corbett. There are also **monitors** and other lesser lizards.

Facilities: The park is open from November 15 to June 15. The best time to visit it depends on one's priorities of interests. For wildlife photography, the best months are April to June.

There is a wide variety of accommodation available at Corbett, much of it very comfortable and well-maintained – options include Tiger Tops Corbett Lodge, Corbett Hideaway and Corbett Jungle Resort in Ramnagar. The park authorities also maintain lodges within the park itself, though it is often difficult to book these, and reservations may only be made with an advance payment. For some of these you will have to bring your own food and bedding.

It is possible to take jeep and, better, elephant rides around the park – booked through the park administration at Dhikala. These are for morning and evening viewing and the elephant rides provide the best opportunities for wildlife viewing as the visibility is excellent and silent and close approach to wild animals is possible. It is not safe to walk through the park as in the past there have been attacks on people by tigers and elephants.

The park administration and centre is at Dhikala where there is also a good library, shop and restaurant. Dhikala itself is a very picturesque location, and the areas around it, including the famous **Dhikala Chaur**, abound in wildlife.

Early morning on the Ramganga.

DUDHWA NATIONAL PARK

Dudhwa National Park, which emerged from a struggle against a welter of vested interests, is even now threatened by a surge of ever-increasing demographic pressure. A viable pattern of coexistence between humans and other forms of life is urgently required if the latter are not to be overwhelmed.

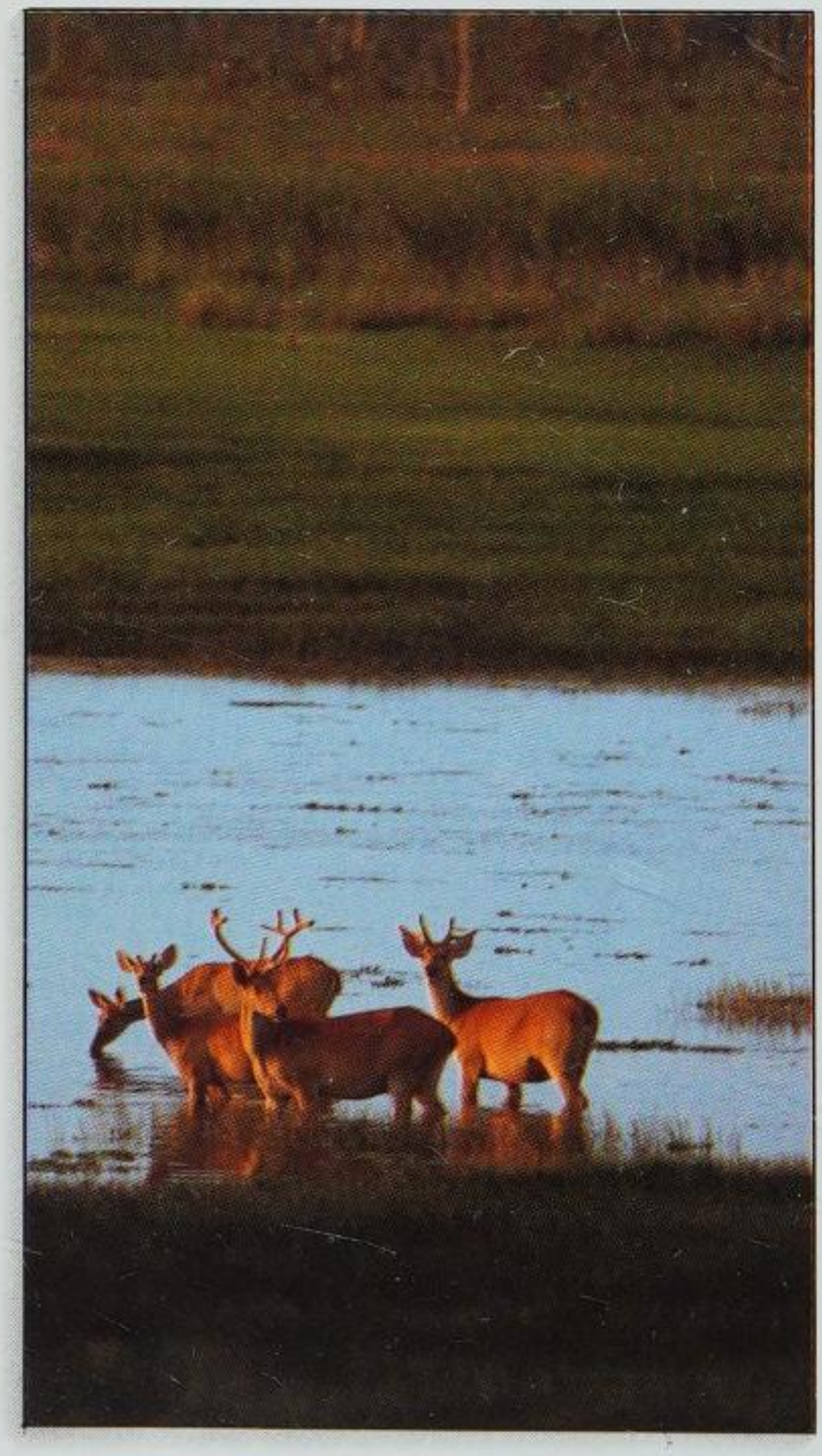
The North Kheri Forest Division, as the area in which the park is located was previously called, has the finest quality sal (*Shorea robusta*) in India; the Forest Department, in its eagerness to exploit this commercially, opposed the establishment of the park, oblivious of their simultaneous responsibility of protecting India's wildlife. "Sportsmen" too were reluctant to surrender the right to kill the so-called game animals that lived there in substantial numbers. The surrounding population protested that they would be denied building materials for their homes and grazing areas for their cattle.

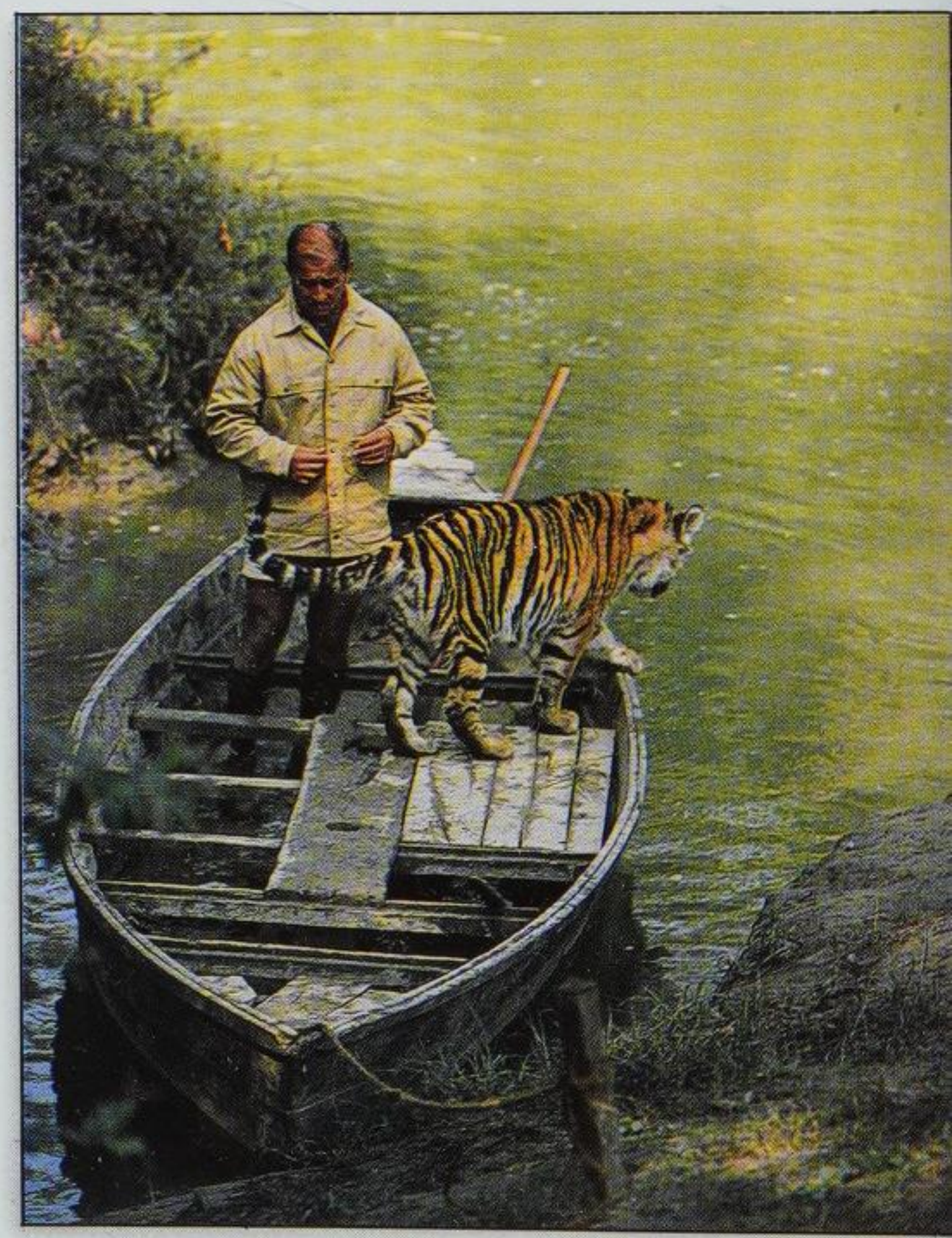
Thanks to the avid lobbying by the well-known conservationist Arjan Singh, and the firm conviction of a conservation-minded prime minister, the late Mrs Indira Gandhi, the division was declared a wildlife sanctuary in 1965 and a National Park in 1977, despite opposition and objections.

Barasingha country: Dudhwa National Park, covering 190 sq miles (490 sq km) of grassland and woodland, consists, as mentioned earlier, mainly of sal forest. The Neora river and the bed of the Soheli, which is dry before the confluence, run along the southern edge, between which and the sal forest to the north lie the grasslands that are the **barasingha's** or **swamp deer's** preferred habitat, about 40 sq miles (100 sq km) of which have been preserved in the park. The rest have been taken over by cultivation.

By far the largest numbers of barasingha, for which the park is best known, occur in the Sathiana and Kakraha blocks, in the southwest and southeast sectors respectively, which together comprise some 17–18 sq miles (4,500 hectares). Sathiana is the wetter area, much of it being inundated for at least short periods during the monsoon season. Grasses are generally tall and coarse, sometimes forming dense thickets that are difficult to penetrate even by elephant. Several swampy depressions, which contain water for all or most of the year, cross the

Preceding pages, a leopard at rest. Below left, swamp deer and right, Billy Arjan Singh with the tigress he reintroduced into the wild.





land from north to south, and numerous jamun trees *(Syzygium cuminii)* attest to the wetness of the habitat; the high-water marks on the trees close to the Neora river may be up to 6 ft (2 meters) and in some years more. The western end of the Sathiana is better drained than the east; the grasses appear to be shorter, and there are large stands of *Imperata cylindrica,* but the various-aged plantings of sisam trees *(Dalbergia sissoo)* obscure the animals. Other timbers of specialized utility are semal *(Bombax ceiba)*, khair *(Acacia catechu)*, sirsa *(Albizzin procera)*, haldu *(Adira cordifolia)* and tun *(Toora cedrela)*.

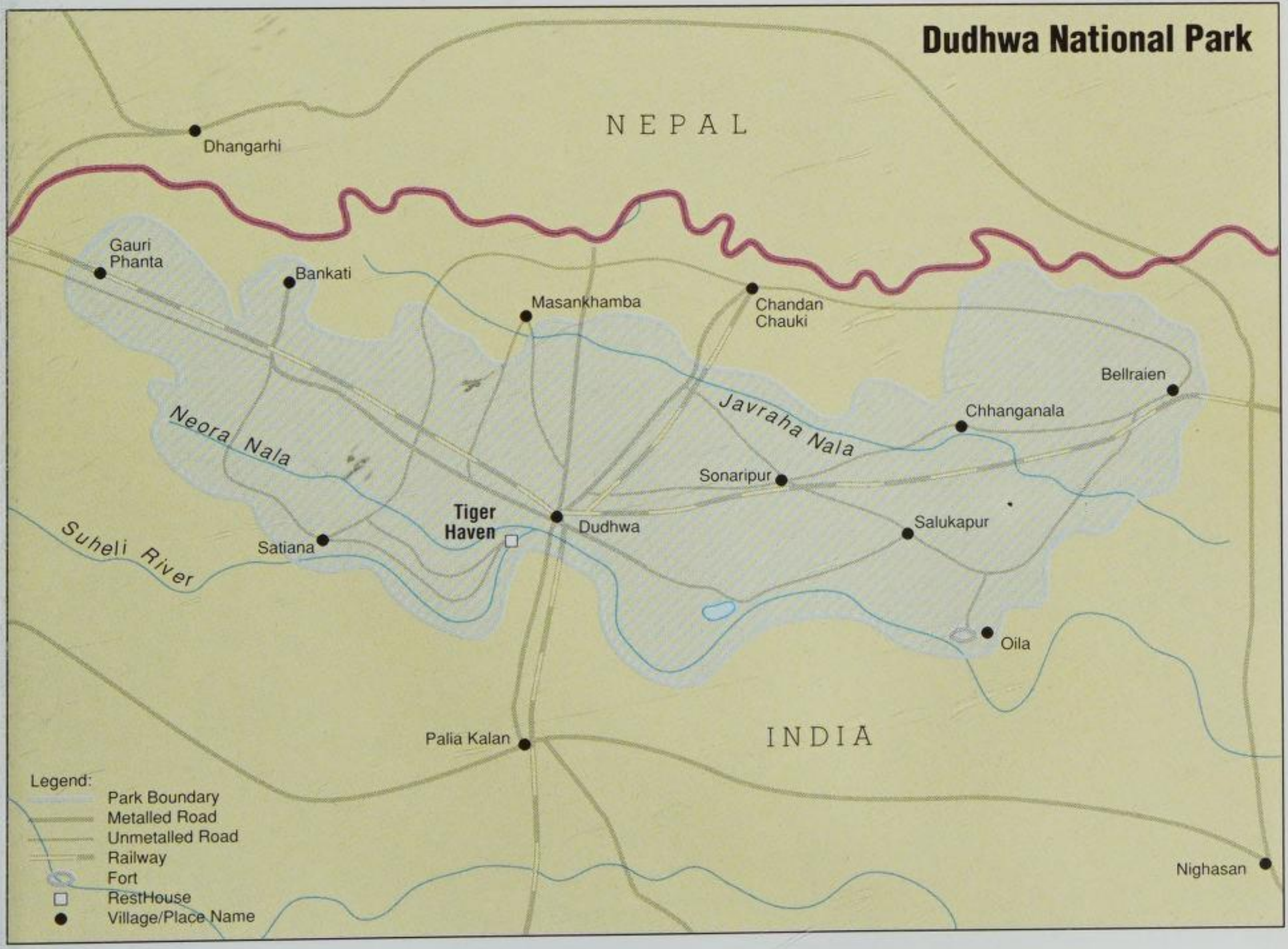
Tigers and leopards: The **tiger**, originally the glamorous objective of every sport killer's rifle sight, and now the cynosure of every wildlife tourist's questing eye, exists in fair number in the park. Unfortunately, there is hardly any buffer zone, and the forested area is surrounded by agricultural crops, mainly sugarcane, which has replaced the tall grasses that tigers used to inhabit in earlier years. With the decimation of their prey species by firearms, the tigers have come into conflict with the adjoining human population.

Dudhwa is celebrated for the successful hand-rearing by Arjan Singh of a tiger cub, Tara, from virtual domestication to free, self-sustained life in the wild. After 20 months of hand-rearing, Tara was launched into the jungle in 1978.

Leopards are few in Dudhwa, as is usually the case in habitats suited to tigers, where competition from the senior predator depresses their population, in spite of the fact that the prey overlap between the two species is limited.

Since Dudhwa provides the optimum habitat for barasingha or swamp deer *(Cervus duvauceli duvauceli)* the remnants of the once prolific deer species is crowded into the wetlands of the park, which has the distinction of having the largest population of this threatened species in the sub-continent. **Mirchia Jheel**, once infamous for its battues of the barasingha, where it was common for as many as 30–40 stags to be gunned down in a morning's "sport," is now under cultivation as are other previous habitat areas. Herds of 200 and over may, however, still be seen in the southern grasslands, their presence rendered more spectacular by the propensity for segregation of the antlered males.

Return of the rhino: An exciting innovation is the attempted reintroduction into Dudhwa of the great **Indian one-horned rhinoceros**,



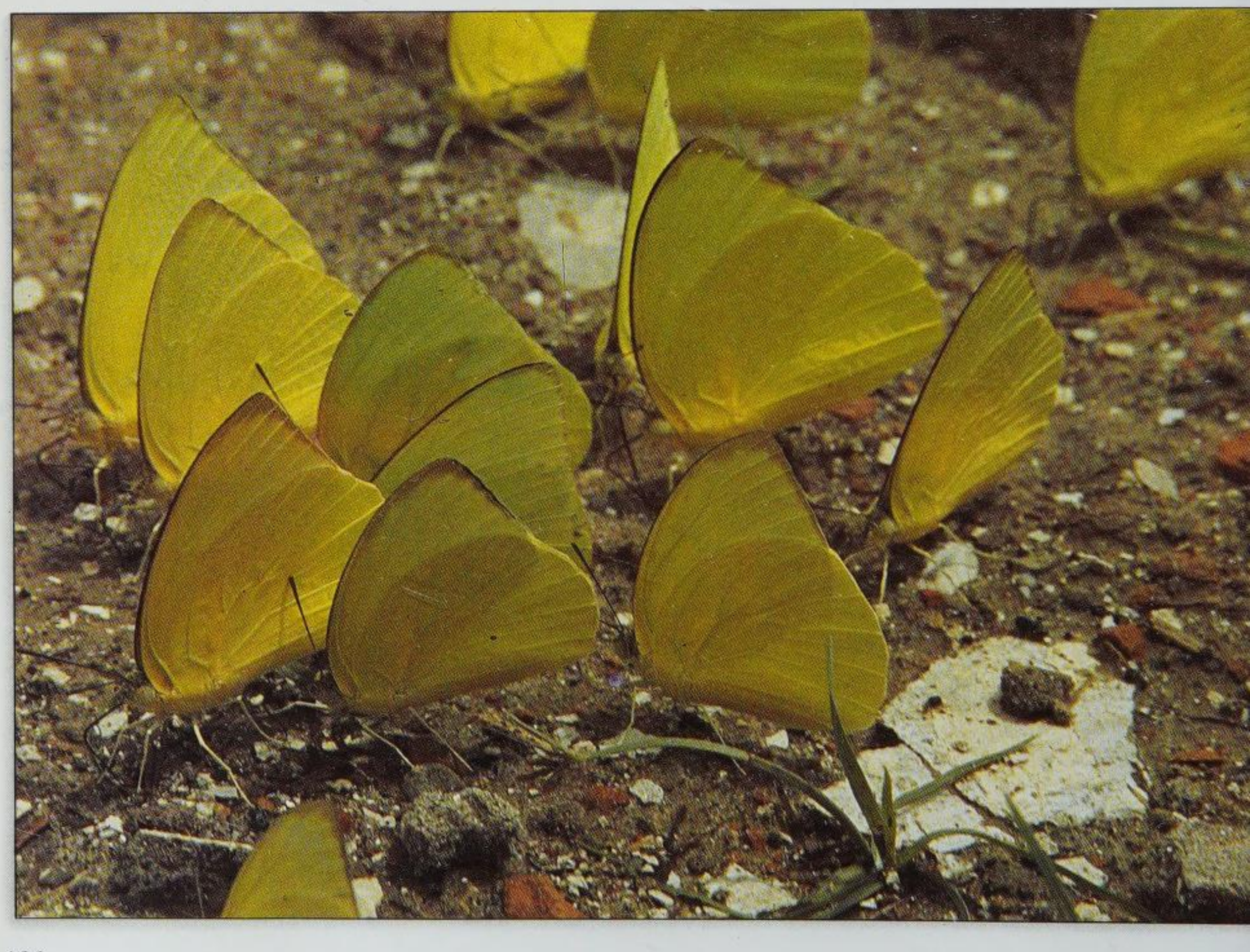
made possible as a gift to conservation by the late Indira Gandhi. Two males and five females were translocated from Assam and Nepal, and have thrived. An increase in their numbers with such a small initial population will be restrained by tiger predation on their young, and severely threatened by the entirely spurious and vicious trade in its remains by humans. Visitors are not allowed into the rhinos' enclosure, but reports are that they have settled well into the park's environment.

Wild elephant, previously only seasonal visitors, were driven, during the 1960s and 70s, by massive habitat destruction in Nepal, to cross over to Dudhwa, and a herd of over 30 animals spent nearly 10 years in the park. As wide-ranging animals they have since returned to Nepal, to remnants of their habitat still surviving in Sukla Phanta and Bardia Wildlife Reserves across the border. Further visits would be welcome, especially as the magnificent herd bull is by computation more than 11 ft (4 meters) tall at the shoulder.

Other animals seen in Dudhwa in fair to dwindling numbers are **sloth bears**, **ratels**, **civets**, **jackals, fishing cats**, **jungle cats** and **leopard cats**. Among the deer, in addition to the barasingha, are the **sambar**, the **chital** (considered the handsomest deer in the world), the **hog deer** and the **barking deer**. Also **wild pigs** and the **blue-bull**, our largest antelope.

In winter, basking on the sandy banks of the Soheli-Neora river, running along the southern boundary of the park, the **snub-nosed crocodile** or **mugger** may be seen. **Otters** are fairly common, as also **pythons** and **monitor lizards**.

Avian variety: Birdlife is prolific, and one ornithologist has said that Dudhwa could establish its claim to fame merely on account of its owls and stocks. Among the night birds of prey are the **great Indian horned owl**, the **forest eagle owl**, the **brown fish owl**, the **tawny fish owl**, the **dusky horned owl**, and the **brown wood owl**. The collared **scops owl** and the **jungle owlet** are among the more vociferous of the lesser varieties. Apart from the **sarus crane**, there are **black-necked storks, white-necked storks, black storks, painted storks, white storks, open-billed storks** and **adjutant storks**. Raptors are of infinite variety and occasionally species of **hawks** and **eagles** appear, which tax the talent of the most gifted of ornithologists. Six **vultures**, including the **cinerious**, are present at times. Among the bustards, the **great Indian bustard** has disappeared, while



Jungle butterflies.

the **Bengal bustard** and the similar florican still hold on in greatly diminished numbers. The **swamp partridge** has a transitional habitat, with the **black** and the **gray partridges** occupying higher grasslands and sandy soils. Among the colorful birds are varieties of **woodpeckers**, **orioles**, **pittas**, **kingfishers**, **minivets**, **flycatchers** and **sunbirds**; also **hornbills**, **bulbuls**, **prinias**, **chats** and **warblers**, whose innumerable species were obviously enumerated by a birdman with a sardonic twist of humor.

Migratory birds are plentiful, especially waterfowl, and as Dudhwa is close to the Himalayan foothills, various species stop over in the course of their migration to the plains in winter. However, national as well as international pressures are becoming manifest. The **white ibis** has vanished, and the ethereal trumpeting of the fighting **demoiselle cranes** is heard no more.

Dudhwa National Park is one of India's most exciting and vigorous wildlife reserves, but also one of the most vulnerable. Looking into the future, two alternatives are discernible. A restricted world of wild nature cordoned off from the exploitation of humans, or an uncontained exploitation of India's environment which will lead to such beautiful areas disappearing.

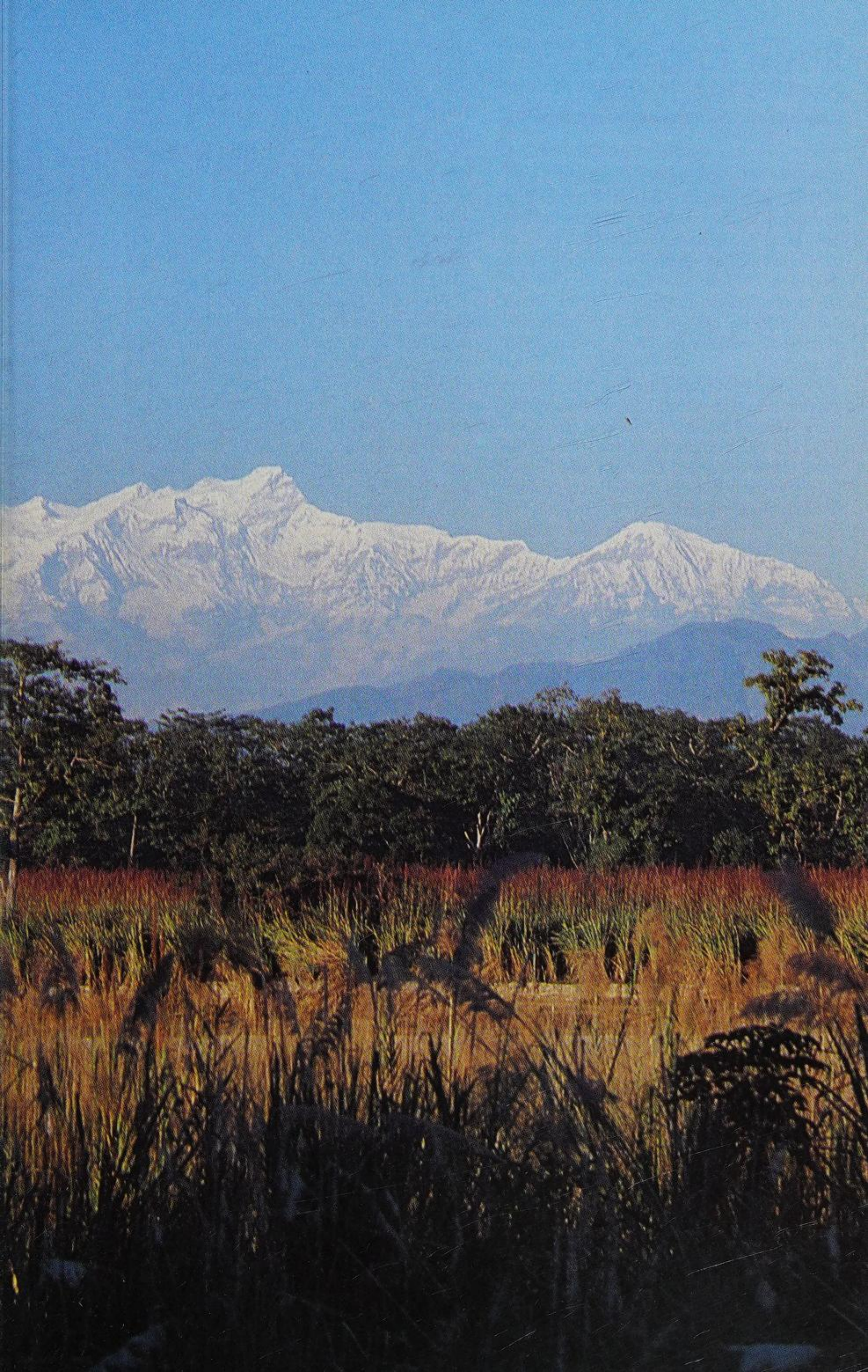
NEW HOMES FOR THE RHINOCEROS

Five hundred years ago the Indian one-horned rhinoceros had a much wider distribution than at present and included much of the Indo-Gangetic plain, Assam, Bengal, Burma and Thailand. By the early 1980s it was restricted to a few pockets. With over 70 percent of the world's population restricted to a single park (Kaziranga), it was long felt necessary to reduce the possibility of disaster to the species through disease or flood by establishing new populations.

The primary needs of the rhino are a well-watered habitat with plenty of food and permanent water holes. One of the few areas of suitable habitat within the rhino's previous range was Dudhwa. The rhino was present in the area until the latter half of the 19th century. Other possible sites are Champaran in Bihar, Intanki in Nagaland and Lalighabri Sanctuary in Arunachal Pradesh.

The article alongside reports the translocation already achieved in Dudhwa National Park and stresses the need for increasing the number of transferees if the population is to be viable.

The rare and endangered Indian Rhinoceros.



ROYAL CHITWAN NATIONAL PARK

One possible meaning of *Chitwan* is "Heart of the Jungle" and it could not be more aptly described. With its tropical creeper-clad forests, great meandering rivers, lush seas of tall elephant grass, and the magnificent backdrop of the Himalaya in the distance, Chitwan is a most romantic jungle. And for its 370 sq miles (960 sq km), it has a richness and variety of wildlife matched by few other parks.

Until the 1950s, a virulent form of malaria prevalent in the region kept Chitwan relatively free of human settlement. Between 1846 and 1950, when Nepal was ruled by the Rana prime ministers, Chitwan was a hunting reserve, exclusively for the ruling classes. It was jealously guarded, if only to preserve it for more hunting. During that period, Chitwan was the venue of many a vicious hunt to which the royalty of Europe and India, and the top brass of the British Raj, were often invited. These hunts were lavish operations with several hundred elephants and beaters being employed to round up and drive big game towards the shooters.

Massive slaughter: However, several years were often allowed to lapse between such massive hunts; they were not always held in the same area, and the habitat was left relatively intact, so the hunted species recovered their losses fairly rapidly. In the last hunt of 1938–39, in which the then Viceroy of India, Lord Linlithgow, also took part, a record bag of 120 tiger, 38 rhino, 27 leopard and 15 bear was taken. That so much big game was still there to shoot in spite of two previous hunts in the same decade indicates what an incredible wildlife haven Chitwan must have been.

In 1950 the Ranas fell from power and the new government opened up Chitwan for settlement. A malaria eradication program was launched in 1954 to attract settlers from the overpopulated hills and by 1960 Chitwan was declared free of malaria. The human population rose from 36,000 in 1950 to 100,000 in 1960 and extensive forest areas were cleared for cultivation. Poaching was rampant, both for the pot and for money, with the rhino being the main target since its horn fetched a handsome price.

When in 1962 a rhino sanctuary was declared south of the Rapti river the **barasingha** *(Cervus duvauceli)* and the **wild buffalo** *(Bubalus bubalis)* had already become extinct. And despite the efforts of the 130-strong armed guards, called Gainda Gasti or rhino Patrol, poaching continued and by the 1960s about 100 rhinos remained, down from 800–2,000 in 1950.

Chitwan was finally gazetted as Nepal's first national park in 1973 and a few years later a contingent of the Royal Nepalese Army was called in to combat poaching. Ever since, poaching of rhino within the park has been almost unheard of, although some does take place outside its limits.

The park headquarters are at **Kasara Durbar** where an old hunting lodge houses the offices and a small museum. Near Kasara is the **Gharial Project**. There are several excellent places to stay, both inside and outside the park. One of the best ways to get around the park is by elephant and there are 7 different stables operated by the park authorities. A different view of the park can be had from a trip down the Narayani River, with excellent opportunities for spotting gharial.

Topography: Along the length of Nepal, in the middle, runs the Mahabharat Range; viewed from the plains, it is a blue mass of mountains. To its south, and almost parallel to and hugging it, runs a lower range of broken hills called the Siwalik. At times, such as in Chitwan, the two ranges separate and enclose huge flat valleys known as *doons*.

The park straddles the Siwalik range, the highest point in it being about 2,000 ft (600 meters). Although much of it is hilly, a portion lies on the floodplain of three large rivers, the Reu, the Rapti and the Narayani, at an elevation of about 465 ft (140 meters).

Much of the park is bounded by these rivers and their tributaries. Both the Rapti and its tributary, the Reu, are low during the dry months (December to April) and are fordable for four-wheel drive vehicles at a few places. But during the monsoon, after a heavy downpour, flash floods turn them into raging torrents and hundreds of trees may be washed downriver. During such times even the bravest of elephants will refuse to cross them. These two rivers meet about half a mile (1 km) east of where they link with the huge Narayani river, which has its origins high up in the Tibetan plateau. It meanders through the flat valley floor and forms a series of large gravel islands, known as *bandarjhula*, from Sigraulighat to Amaltarighat. The Narayani eventually cuts a narrow gorge in the Siwalik and becomes the Gandak in India before joining the holy Ganga – the Ganges.

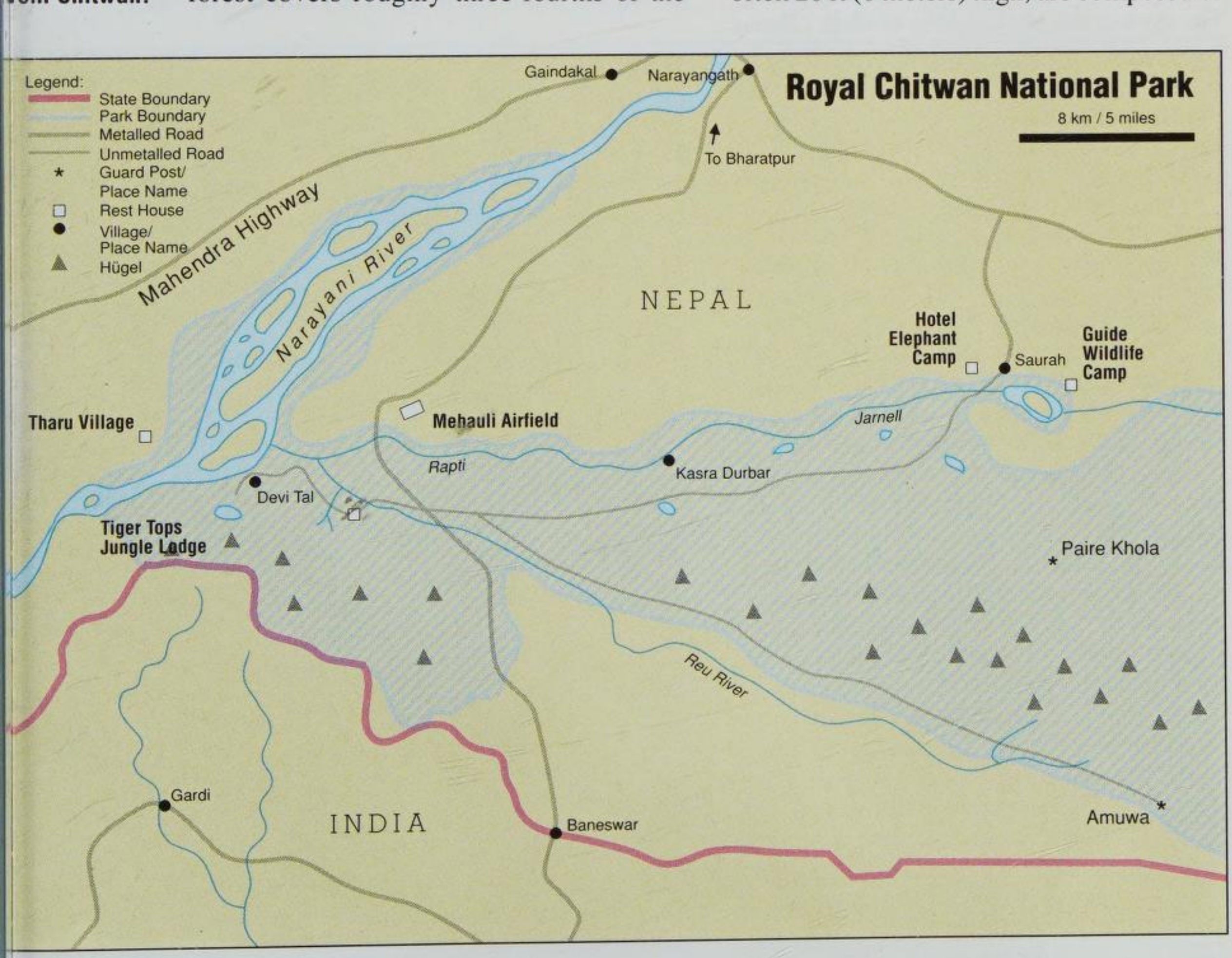
Climate: Chitwan has a monsoonal climate with high humidity most of the year. In March and April the air is relatively dry. Apart from the cool months of December to February, the weather is generally hot during the day, particularly from May to September. Mid-June heralds the coming of the monsoon, which is the most dramatic time of year, with heavy showers and occasional floods. After the monsoon the jungle is lush and green and the sky crystal clear, with the snow-covered Himalaya 50–60 miles (80–100 km) away, clearly visible, especially in the evening. During the winter months a thick mist descends on the forest around 10pm and persists into the late morning. The humidity reaches its peak in the early hours of the morning and the dew dripping from the trees onto the forest litter below makes a sound loud enough to convince newcomers to Chitwan that it is raining.

Two types of forest: The vegetation of Chitwan is tropical moist deciduous and two main types of forest may be recognized; the sal forest and the floodplain forest. On high ground and in the hills, where drainage is good and flooding does not occur, is the sal forest, so called after the dominant tree, sal *(Shorea robusta)*. This forest covers roughly three-fourths of the park area and attains a height of 130 ft (40 meters) or more at the base of the hills but becomes stunted higher up. A common associate of sal is saj *(Terminalia tomentosa)*, another large tree, easily recognized by its gray bark that resembles the skin of a crocodile. The kusum tree *(Schleichera trijuga)* bursts into a riot of red when the new leaves sprout in February–March, later turning to green, and the large-leaved tantari *(Dillenia pentagyna)*, a medium-size tree, bears clusters of bright yellow flowers in the late spring. Other components of the sal forest are the sturdy karam or haldu *(Adina cordifolia)* and the middling-size sandan *(Ougenia dalbergoides)*.

Giant vines and creepers, such as debre lahara *(Spatholobus parviflorus)* and bhorla *(Bauhinia vahlii)* twine upwards, using the larger trees for support. Sometimes a branch or a whole tree may collapse under their weight. The trees and their limbs also harbor several species of orchid and other epiphytes. On the very high ridges of the Siwalik grow sallo or chir pine *(Pinus roxburghii)*.

On the floodplain, which is prone to waterlogging and flooding during the monsoon, patches of grassland and riverine forest occur. Dense stands of elephant grass, often 20 ft (6 meters) high, are composed of

Preceding pages, view from Chitwan.



Saccharum spp., *Phragmites karka*, *Themeda villosa*, *Arundo donax* and *Arundinella nepalensis*. Some grasses are shorter, usually under 7 ft (2 meters) tall, such as *Imperata cylindrica* and *Bothriocloa intermdeia* and are commonly found in old village sites, although taller species are gradually displacing the short grasses. In Chitwan, most grasses flower between August and November, different species at different times – and there are many species. The change of color of the grass canopies from white to purple to yellow and various shades of pastel is a memorable sight.

Interspersed in the grassland are trees such as shisham *(Dalbergia sissoo)*, Khair *(Acacia catechu)* and simal *(Bombas ceiba)*, especially on mid-river gravel islands and on the sandbanks of the Reu, Rapti and Narayani rivers. Both shisham and khair average about 45 ft (14 meters) in height but the simal is the largest tree in the park. Its flowers attract a variety of birds in the spring and during the course of a day dozens of species may be spotted in a single tree.

Mature riverine forests are often dense with a great variety of shrubs and other trees. In moist places, such as the **Itcharni Tappu** and other areas near **Sauraha**, there are thick patches of bheller *(Trewia nudiflora)*. The dark crooked skeletons of dhak *(Butea monosperma)* suddenly burst into flower in February and are aptly called "Flame of the Forest."

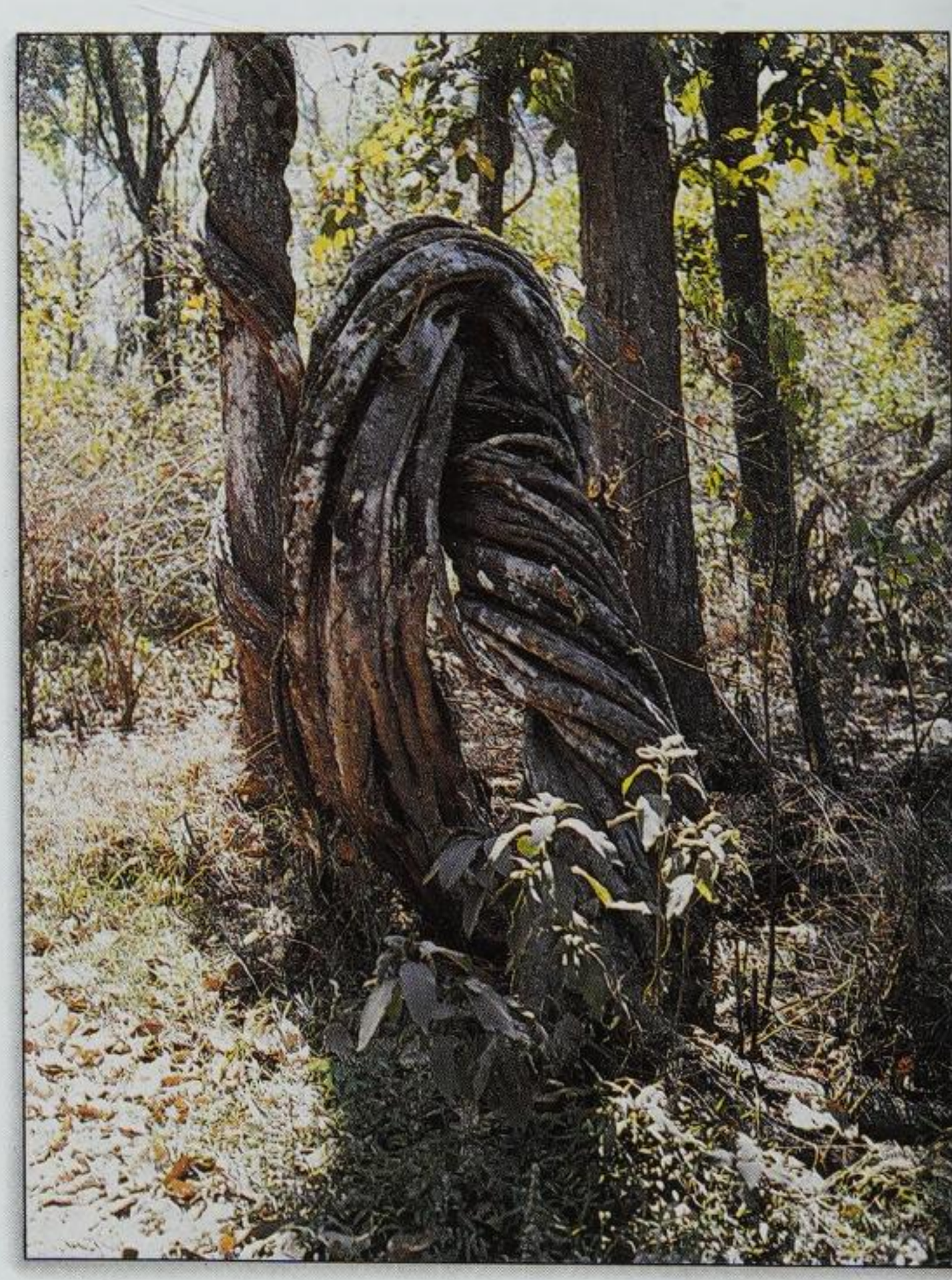
The beautiful white flowers of bhanti *(Clerodendron viscosum)*, seen in March and April, have a lovely fragrance and attract numerous colorful butterflies and bees. Also in moist spots, several kinds of strangler figs *(Ficus spp.)* may be seen draped over their hosts, at varying stages of takeover. Foxtail orchids decorate some trees with their purple blossom in April, and the magnificent orange flowers of sungawa *(Dendrobium densiflorum)* in June–July.

Fire, an ecological factor: Apart from rainfall and flood, an important factor in the ecology of Chitwan is fire. Each year some 50,000 to 100,000 villagers enter the park for two weeks, some time in December and January, to collect thatch grass and reeds, both vital building materials for their houses. Having reaped their harvest, they set fire to the grassland and the fire spreads into the hills. Burning is intermittent and continues until the end of April or the beginning of May, when the pre-monsoon showers put an end to it. These fires have been an annual event, perhaps for hundreds of years, and this must surely affect the composition of the forest. Perhaps it explains the predominance of fire-tolerant species, such as sal and simal, and also why tall coarse grasses are gradually replacing the short grass from old village sites.

Burning effectively "opens up" the grassland and the forest and the leaf-fall of spring improves visibility even further, so wildlife sightings at this time of the year are particularly good. Regrowth of grass is fast and herbivores concentrate on the once burnt grassland to graze on the succulent new grasses, and chital herds a hundred strong may sometimes be seen.

In and around the "Tals": The floodplain is crisscrossed by numerous seasonal water channels and dotted with marsh, swamp and lakes. Only a handful of lakes are of any size; **Tamar Tal** and **Lame Tal** near Kasara Durbar, and **Dhakre Tal**, **Lame Tal** and **Devi Tal** near Tiger Tops. The last is the largest and most spectacular of all.

These lakes are the rhino's favorite haunts and also support a number of water birds, fish, turtle and **marsh mugger** *(Crocodylus palustris)*. The mugger may grow to over 10 ft (3 meters) long and with its blunt nose and huge jaws lined with dirty yellow teeth is sinister looking, the wavy outline of its mouth giving the impression of a nasty smile. The



Giant Vine *(Spatholobus sp.)*

mugger will eat anything that it can overpower and kill, from birds and amphibians to deer, wild boar and even python. They prefer enclosed waters but are also found in rivers.

The **gharial** (*Gavialis gangeticus*), on the other hand, lives only in rivers and feeds largely on fish. Easily recognized by its slender snout, it is larger than the mugger and may reach 16 ft (5 meters) in length. The Narayani, with about 40 adults, has the largest single concentration of wild gharial anywhere. Several young gharial, artificially hatched and hand reared at the **Gharial Project** near Kasara Durbar, have been released in batches since 1980 and many have survived. The gharial is, however, very wary of humans and will slither into the river even when as far as 150 ft (46 meters) away. But look for their tell-tale eyes and nostrils gleaming over the surface of the water. The best time of year to see crocodiles is winter (October–February) when they come out of the water and bask in the sun, often all day long.

Another peculiar aquatic predator in the Narayani river is the rare **Gangetic dolphin** *(Platanista gangetica)*. About 7 ft (2 meters) long when adult, this spindle-shaped animal feeds on crustaceans and fish on the riverbed and breaks the surface every minute or so to breathe. Its hissing sound is unmistakable and it may be seen at the Narayani-Rapti confluence from July to September and at Amaltarighat for most of the year, except when the water is low from January to April. The **smooth-coated otter** *(Lutra perspicilata)* is another common aquatic predator and to watch a family playing outside its den is an endearing sight.

Indian pythons *(Python molurus)* are common near large bodies of water and these heavy reptiles, which may reach 16–20 ft (5–6 meters) in length, sometimes waylay deer, which come to drink. An adult python can swallow a full-grown **hog deer** *(Axis porcinus)*, weighing 45 lbs (20 kg) and then go without food for months.

Birds – Resident and Migratory: Chitwan is a bird-watcher's paradise. It is not unusual to spot a hundred species in a single day, depending of course on the time of year. Over 440 species of birds have been recorded, of which a little under half are year-round residents. These include the beautiful **Indian peafowl** *(Pavo cristatus)* common in the floodplain, **openbill stork** *(Anastomus oscitans)* near marsh and lakes, small **pied kingfisher** *(Ceryle rudis)* over open rivers, and three-toed **golden backed woodpecker**

al forest.

(dinopium shorii) in the sal forest. The **blackheaded oriole** *(Oriolus xanthornus)* fills the forest with song, and the loud honking of the **giant hornbill** *(Buceros bicornis)* may be heard.

Of the many winter visitors, such as ducks, geese, waders and leafwarblers, the **brahminy duck** *(Tadorna ferruginia)* is the most conspicuous, not only because of its numbers but also its colors and call. Another distinguished winter visitor is the huge **blacknecked stork** *(Xenorhynchus asiaticus)*, a rare bird seen on open river banks. By comparison, the summer visitors are much fewer but include such colorful birds as the **paradise flycatcher** *(Terpsiphone paradisi)* and the **golden oriole** *(Oriolus oriolus)*, which arrive in February–March, and the **Indian pitta** *(Pitta brachyura)* and **green-breasted pitta** *(Pitta sordida)* in April–May.

Among the rarities of Chitwan's birds are the **grayheaded fishing eagle** *(Ichthyophaga ichthyaetus)*, seen near swamps and lakes; the **great slaty woodpecker** *(Mulleripicus pulverulentus)* near the forested hill streams; and the yellow bittern *(Ixobrychus sinensis)* in tall marsh grass. In late spring the rare **Bengal florican** *(Eupodotis bengalensis)* males may be seen in the grassland, displaying to their mates, their white wings in sharp contrast to their black bodies.

The best months for bird-watching are February and March, when the winter visitors are still around, the summer visitors have started to arrive, and the breeding birds become very vocal and conspicuous. Also, the visibility is at its best because of burning and leaf-fall, and the trees are in blossom, which attracts the birds.

Spotting the mammals: In terms of seeing wildlife, the floodplain belt is the best as it harbors a larger concentration of animals than the sal forest. Chitwan's estimated 450 **rhinos** *(Rhinoceros unicornis)* are found almost wholly in the grassland and riverine forest. Chitwan is one of the two last strongholds for this endangered rhino (Kaziranga in Assam being the other) and it harbors a quarter of the world's total.

In the Siwalik hills is the **gaur** *(Bos gaurus)*, the most magnificent among hoofed animals. During the spring the gaur descend to the grassland in search of new shoots after the fires. The forests around Devi Tal, Tamar Tar, **Dumaria** and **Khagendramalli** are particularly good spots for seeing them in February–April.

Of the four species of deer found in Chitwan, the **hog deer** *(Axis porcinus)* is

Sambar deer with an egret.

restricted almost exclusively to the grassland, and the **chital** *(Axis axis)* to the lowland parts as it avoids sloping ground and hilly terrain. The **sambar** *(Cervus unicolor)* and the **barking deer** *(Muntiacus muntjak)* are found throughout the park.

Also common throughout the park, but mainly in the floodplain, is the **wild boar** *(Sus scrofa)*, which often lives in large groups of 20, even 30 or more, animals, although 6–10 is the average. The wild boar and the four kinds of deer all form important prey species for the **tiger** *(Panthear tigris)* and the **leopard** *(Panthera pardus)*.

Monkeys also feature strongly on the leopard's menu and two species occur in the park. The handsome **gray langur** *(Presbytis entellus)* with long limbs and tail and a black face, lives mainly in the sal forest in troops of 10–20 individuals. Langurs are not particularly shy and will allow a fairly close approach, but not the Chitwan **rhesus macaque** *(Macaca mulatta)*. Unlike their counterparts found near railway platforms and temples, who show complete contempt for people, the rhesus of Chitwan is extremely shy.

Chitwan leopards are rarely seen in the open.

The rare ones and the great cats: Although Chitwan has over 50 species of mammals, they are often not easily seen because of their nocturnal and secretive habits. Rare mammals in Chitwan include the **wild dog** *(Cuon alpinus)*, the **serow** *(Capricornis sumatraensis)*, the **hyena** *(Hyaena hyaena)*, the **spotted linsang** *(Prionodon pardicolor)* and the **ratel** *(Mellivora capensis)*.

The two large predators in the park are the tiger and the leopard. They do not tend to mix well – the tiger may attack and even kill the leopard. The leopards are often forced out to live on the edge of the park. However, the two can live side by side. Because of Chitwan's closed borders, encounters between the two are reduced somewhat. Good camoflague aids the leopard, and by altering its schedule and becoming more diurnal it becomes easier for it to share the same area as the tiger.

Moreover, competition between the two is further reduced by the tiger's preference for larger prey species than those of the leopard. Chitwan has a fair number of leopards but they are not often seen. It is estimated that about 40 breeding adult tigers exist in the park, which makes a total of up to 120, including cubs, sub-adults and transients. You may sometimes see a tiger, a pair or exceptionally a family of female and cubs, but despite such numbers tiger sightings are not common.

ROYAL BARDIA NATIONAL PARK

About 250 miles (400 km) to the west of Khatmandu, in far western Nepal, lies the **Royal Bardia National Park**, also known as **Karnali** because of the great river of that name that drains the region. Initially set aside as a royal hunting preserve during the Rana regime (1846–1950), with an area of 134 sq miles (348 sq km), increased to 1985 to 374 sq miles (968 sq km).

The reserve is bounded to the west by the Karnali river and its distributary, the Girwa, and to the east by a section of the Nepalgunj-Birendranager highway. A large part of the reserve is hill country as it drapes the southern flanks of the Churia or Siwalik hills, the outermost range of the Himalaya. The crestlines of the Churia form its northern boundary.

From the base of the Churia the ground slopes gradually southward for about 5 miles (8 km), and this highly porous ground is called the *bhabhar*. Thereafter, it flattens out as far as the eye can see. This is part of the Gangetic plain, and the strip between the Bhabhar and the Indian border is known as the *terai*. The southern edge of the reserve is mainly *bhabhar*, with a small piece of *terai* at the southwest.

Flora and fauna: Bardia, with its stately sal *(Shorea robusta)* trees, its tall termite mounds, and its *phantas*, is very reminiscent of Dudhwa in Uttar Pradesh. The forests are tropical dry deciduous. Since a great part of the park is high ground with good drainage, it is dominated by the sal, a hardwood tree. The sal associates with many other trees, notably saj or asna *(Terminalia tomentosa)*, and on the highest ridges of the hills, with chir pine *(Pinus roxburghii)*. The sal forest and its shaded ravines are the home of **sambar**, **barking deer**, **porcupine**, **sloth bear** and **kaleej**.

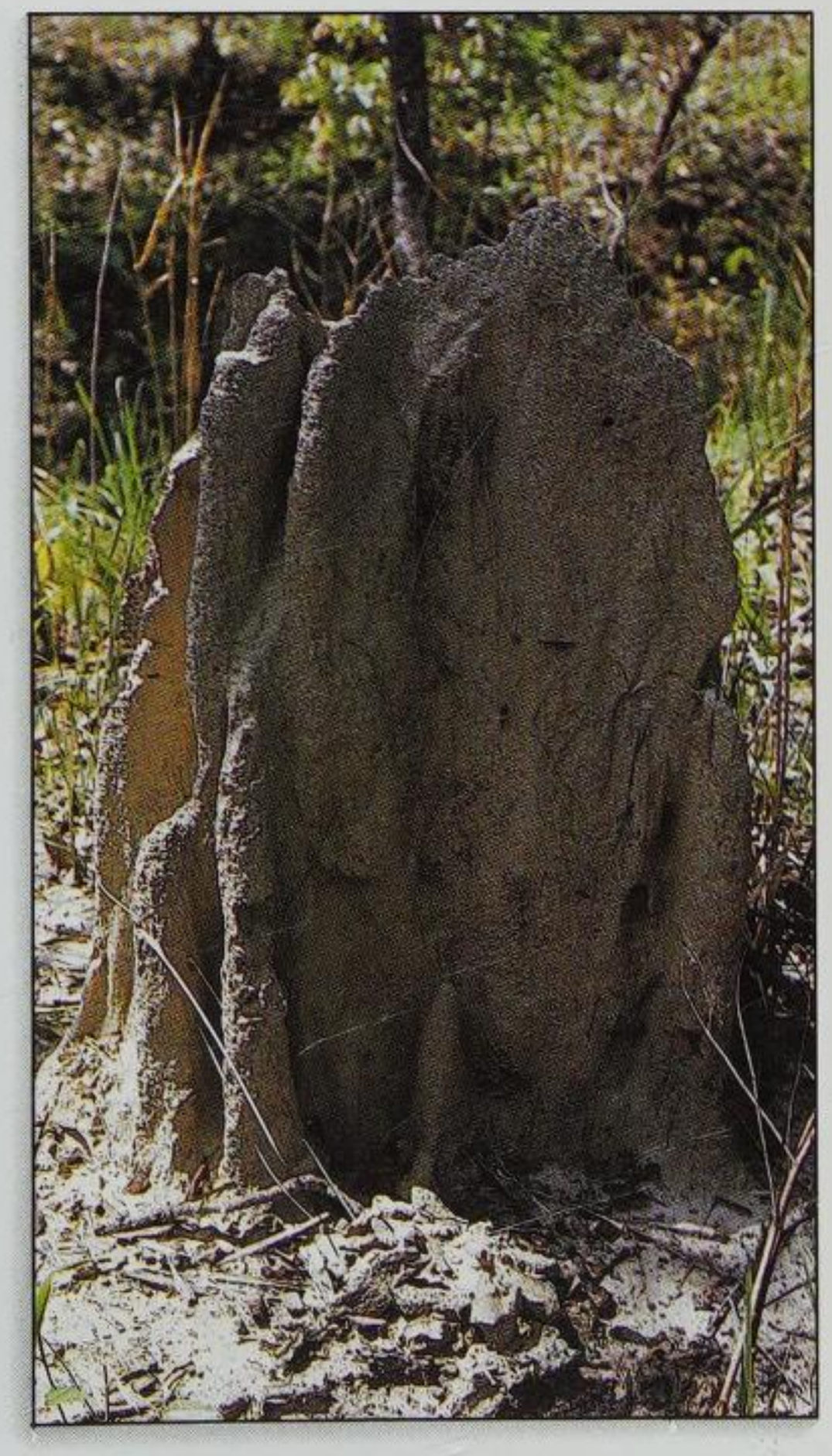
On the lower ground is a mosaic of grassland and riverine forest with the simal trees *(Bombax ceiba)* standing above all others. The simal, when old, are gigantic in size and develop huge buttresses at their base for extra support. Their large red, sometimes orange, flowers are a memorable sight in the early spring. The *phantas* are old village sites where a small herd of **barasingha** *(Cervus duvauceli)* and large numbers of **chital** *(Axis axis)* may still be seen.

The waters of the Karnali emerge from the narrow gorge at Chisapani, fan out over a gentle slope and eventually slow down to a sluggish pace on the plains. A couple of miles downriver of the gorge it branches out into two main channels or distributaries – Karnali to the west and Girwa to the east – sand and gravel. Here shisham *(Dalbergia sissoo)*, khair *(Acacia catechu)* and simal flourish (such an assortment of trees is common on all riverine sites). These islands are the favorite haunts of the **nilgai**, the subcontinent's largest antelope.

But much of the park is drained by another smaller river, the **Babai**, which courses down the Siwalik range and collects spring and rainwater from its numerous seasonal and perennial tributaries. The Karnali-Girwa and the Babai attract a large number of migratory waterfowl.

Wildlife viewing: The best place for this is the old reserve area between the Karnali-Girwa and the Babai river, especially along the former, and the adjoining *phantas* such as **Baghora** and **Lamkoili**.

At present the only concessions in Bardia are run by Tiger Tops. Their Karnali Lodge is not far from the park headquarters at Thakurdwara – where elephant safaris can be booked – and **Karnali Tented Camp** is south of Chisopani on the bank of the Karnali-



Left, Karnali river and right, termite mound.

Girwa. There are also a few forest lodges around the park headquarters at Thakurdwara.

You need four to five nights to fully appreciate the jungle and its sights in Bardia. A trip there is a mixture of wildlife, culture and adventure. All, even any one, of the following day-trips will confirm this.

Floating Down the Girwa: Taking a boat or canoe ride down the park's rivers is an excellent way of spotting wildlife, as well as being scenically stuning.

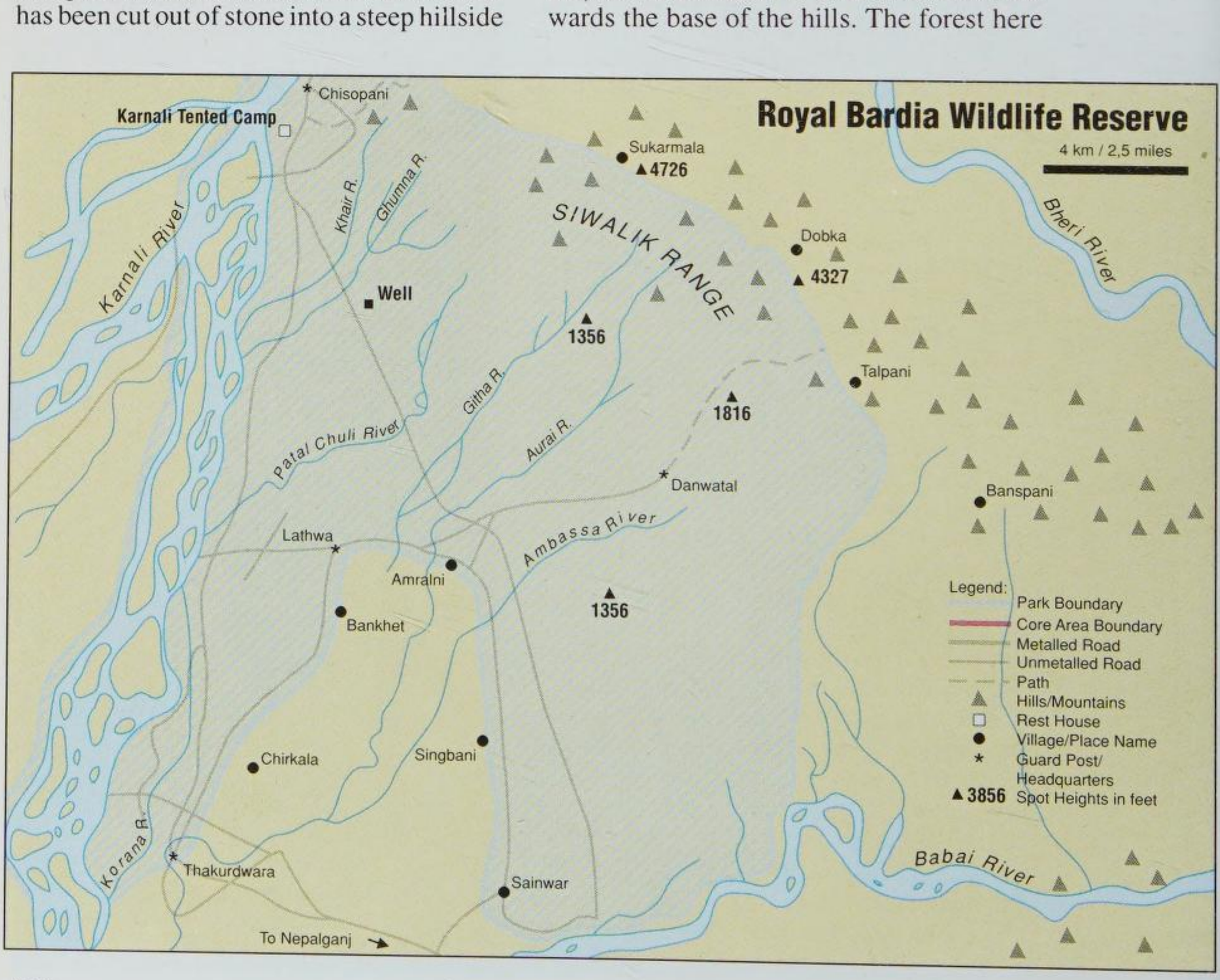
On this river trip you will see many species of birds – **ducks**, **heron**, **gull**, **tern**, **kingfisher**, **cormorant** and **osprey**; and perhaps also **rhesus monkey** *(Macaca mulatta)*, **langur** *(Presbytis entellus)*, **nilgai** *(Boselephus tragocamelus)* and **otter** *(Lutra perspicillata)*. If you are lucky, you may even glimpse the **Gangetic dolphin** as it surfaces for air – Manu Tappu is a particularly good place for this. On your drive back to camp, via the *phantas,* you will add more animals to your spotting list, such as **chital** and **wild boar**.

Trek out and float back: Take an early morning walk up to Chisapani gorge, birding as you go. Cross the river by ferry or by raft, then follow the old trading route that runs along the west bank of the Karnali. The road has been cut out of stone into a steep hillside and is well worn by centuries of use by traders and their pack animals. You may meet traders from Dailekh and Achham to the north, heading for Chisapani with their produce and then returning home with salt, kerosene and other goods. These are hardy men and women, with even hardier beasts of burden, mainly goat and sheep, each laden with a 25 lb (55 kg) load on its back. The hillside is forested and during the mid-morning, bird-watching conditions are excellent.

After about 2.5 hours of walking, you descend to the riverbank for lunch just short of the small village of **Kachalipur**. Travelling back through the gorge by boat, you will be struck by the peculiar rock formations along the banks, which provide excellent hideouts for **otters**, and good vantage points for **crocodiles** to bask in the sun.

Gray and crimson **wall creepers** *(Tichodroma muraria)*, common winter birds in the gorge, fly about on the vertical cliffs and here and there white droppings of cormorant and darter decorate the black rock. As you come out of the gorge, a spectacular view of the floodplains opens up in front of you.

Jeep and foot safari: Take a jeep southeast (with a packed lunch), for about 8 miles (13 km) and near **Amreni** turn northwards towards the base of the hills. The forest here

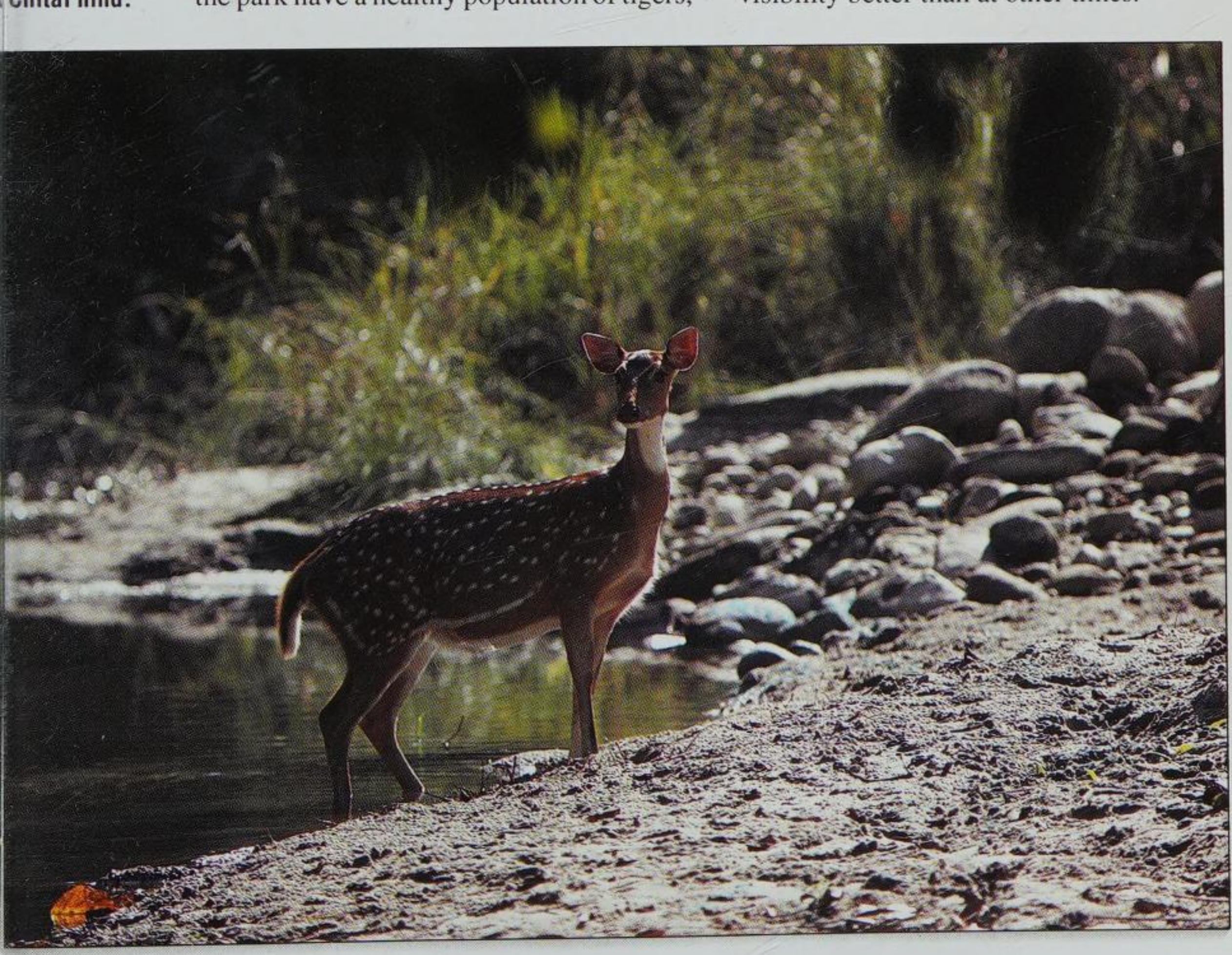


becomes dense and dark, giant creepers drape the sal trees and the "tentacles" of the strangler figs literally squeeze the life out of their hosts. You may see evidence of the passage of **wild elephant** – droppings, tracks, uprooted trees, and trees stripped of their bark. Carry on to **Danawa Tal guard post** and trek into the hills for a couple of hours. On the stream beds look for the tracks of the animals that have passed here – **tiger**, **leopard**, **monkey**, **porcupine**, **civet** and others.

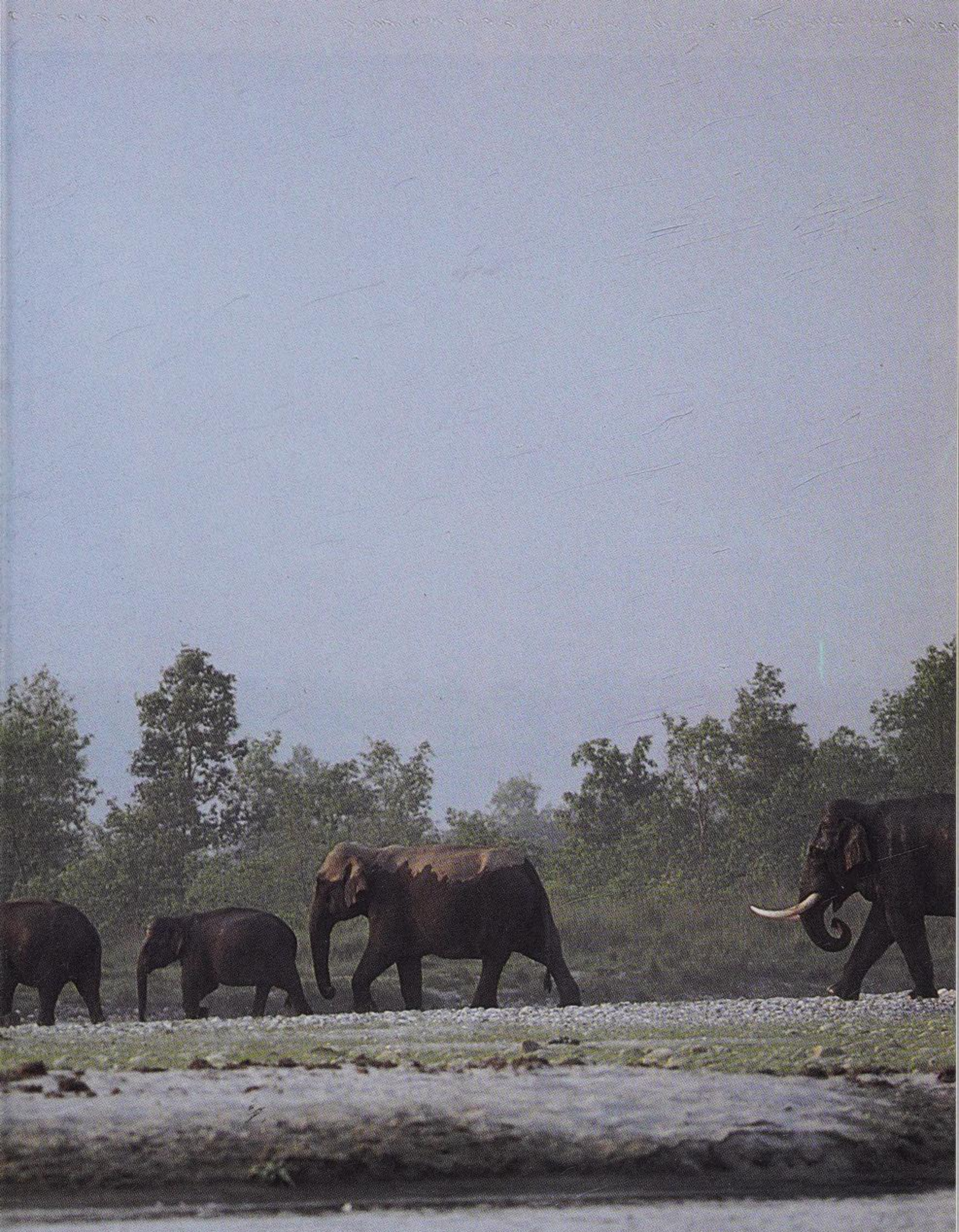
Stop by a pool for a picnic lunch and then drive back to the Babai river. **Peafowl** and **red jungle fowl** are common here and you may also see **gharial** or **mugger crocodiles**. On your return, visit the *phantas* again. Towards late afternoon, the jungle comes alive with the activity of its denizens and you may spot **sambar**, **barasingha** and **wild boar**, not to mention the abundant **chita**.

Spotter's luck: But what you see, and how much, depends on chance, and in any of these three outings you could well see **tiger**, **leopard**, **sloth bear** and **wild elephant**. The **rhinos** introduced here in early 1986 appear to be flourishing and are now one of Bardia's star attractions. Bardia is one of the best places in Nepal to spot **tiger**. Not only does the park have a healthy population of tigers, but baiting – the laying out of food to attract the animals – is allowed (unlike in Nepal's other national parks and sanctuaries) and so a sighting is far more certain than elsewhere. Other predators of Bardia include **hyena**, **wild dog**, **jackal**, the large and the small **Indian civet**, **mongoose**, **python**, **mugger** and **gharial**. The tall grass also harbors some **hispid hare**, believed, until recently, to have become extinct. Over 350 species of birds have been recorded.

The tourist season here is from November through May; for the rest of the year the reserve is inaccessible because of the monsoon floods. The weather is generally warm, but gets cold in the early morning and evening in December and January. During these two months, each year, local villagers are allowed to enter the park for a couple of weeks to collect thatch grass and reed to use as building materials for their houses. Having collected their harvest, the villagers set fire to the grassland and forest, and much of the undergrowth is burnt to ashes. But regrowth is quick and numerous herbivores congregate on the now open *phantas* to feed on the new succulent grasses. Thus the best wildlife sightings in Bardia are between January and April when the vegetation is "open" and visibility better than at other times.



Chital hind.



KAZIRANGA NATIONAL PARK

No two places could be more diverse in their physical appearance and character, yet the twin sanctuaries of Assam which would form a perfect triangle with Guwahati are together completely representative of the Indian northeast. While Kaziranga is flat country with elephant grass and shallow swamps interspersed with large patches of semi-evergreen forest, Manas lies at the foot of the Bhutan hills and through it flows the Manas river, which spills into the plains, splitting into two streams, the Beki and the Hakua. On either side of the Manas river, plentiful wildlife and magnificent scenery combine to form one of the world's best and most picturesque wildlife reserves.

Like Manas, Kaziranga too lies on the banks of a river – the mighty Brahmaputra. The name, literally translated, means "son of Brahma" who, according to Hindu mythology, is the creator of the universe, but the massive river could just as easily have been named after Shiva, the destroyer. Each year, with the onset of the monsoon, it overspills its banks and the surrounding areas are ravaged. In Kaziranga, the river forces people and wildlife to take shelter on whatever high ground they can find, and, according to a local estimate, it washes away almost a thousand hog deer each year. In 1998 and 2000 the floods were devastating and a substantial part of the park's animal population were killed, including (in 1998) 35 rhinos and 30 percent of the hog deer. However, when the river withdraws, leaving *bheels* (swamps) with a shallow spread of water, Kaziranga comes into its own, offering the visitor some of the best views of the **Indian one-horned rhinoceros** and **wild buffalo**.

Kaziranga: The monsoon and the Brahmaputra leave Kaziranga with a comparatively short season – January to May. Approachable from either Guwahati or Jorhat, it is sandwiched by the highway to the south and the river to its north. The reserve sprawls over 165 sq miles (430 sq km) of grassland and impenetrable vegetative luxuriance comprising close-tangled and thorny rattan cane, elephant grass and tall trees of the evergreen forests. Until 1908, Kaziranga was a sportman's and poacher's paradise, but the rapidly declining population of rhino forced the authorities, in 1926, to constitute it a reserve forest, closed to shooting. Some estimates put the then rhino population at about a dozen and the subsequent revival of this massive and powerful animal, reminiscent of prehistoric creatures, has been one of the more notable feats of faunal conservation. In 1940, Kaziranga was officially declared a wildlife sanctuary.

Good accommodations are available just outside the park, especially the excellent Wild Grass Resorts. Both private operators and the park authorities provide jeep hire. Better still is an elephant safari, booked through the Forest Range Officer.

In almost all wildlife reserves in India, the visitor needs to give themselves a few days to have a reasonable chance of seeing wildlife at close quarters. Kaziranga, however, is the exception where one can hope to see most of the mammals for which it is known in a single day. During the day, especially in the morning, Kaziranga has a thick ground mist that blurs the distant horizon and creates a very special atmosphere in the area – covering its creatures with a ghostly haze; undoubtedly, Kaziranga is one of the few unspoilt valleys of the Brahmaputra.

In the 1930s, Kaziranga was virtually a closed book and the sanctuary was opened to tourists only around 1938. The **rhino**, the main attraction in the park, was then unused to humans and would quite blindly (they are notoriously shortsighted and charge whatever they perceive as a challenge) take on any intruder. Fortunately, at the last minute they tended to veer off, leaving almost everything in the area badly shaken but rarely hurt. The rhino is now a lot more used to humans, and though a mother with a calf may demonstrate in front of a riding elephant, they often let people get amazingly close to them.

The only natural enemy of the rhino is the **tiger** of which there is a sizable population in the park (a recent estimate put the figure at 80). The tall grass and the patches of forest provide excellent cover for the big cats, which are therefore rarely seen. Sometimes a tiger will attack and kill a rhino calf despite the mother's aggressive vigilance, but the rhino suffers more at the hand of man. Its horn, believed to be an aphrodisiac by the ancient Indians and highly sought after by Chinese medicinemen, is a lucrative target for poachers who usually operate from the Darrang district across the Brahmaputra river and sometimes from the Mikir hills where the animals retreat during the floods. The rhino, being a creature of set habits, follows well-worn trails and even defecates at the same spot each day. Taking advantage of its

Preceding pages, elephants crossing the Manas river. Left, capped langur.

regular habits, a pit large enough to accommodate its body is dug by the poachers in its usual path and then covered with leaves and grass. The unwary animal falls into the pit where it is killed and its horn hacked off with a *dao*. Other parts of the body also command sale value. As both sexes carry the horn, the threat is doubly compounded.

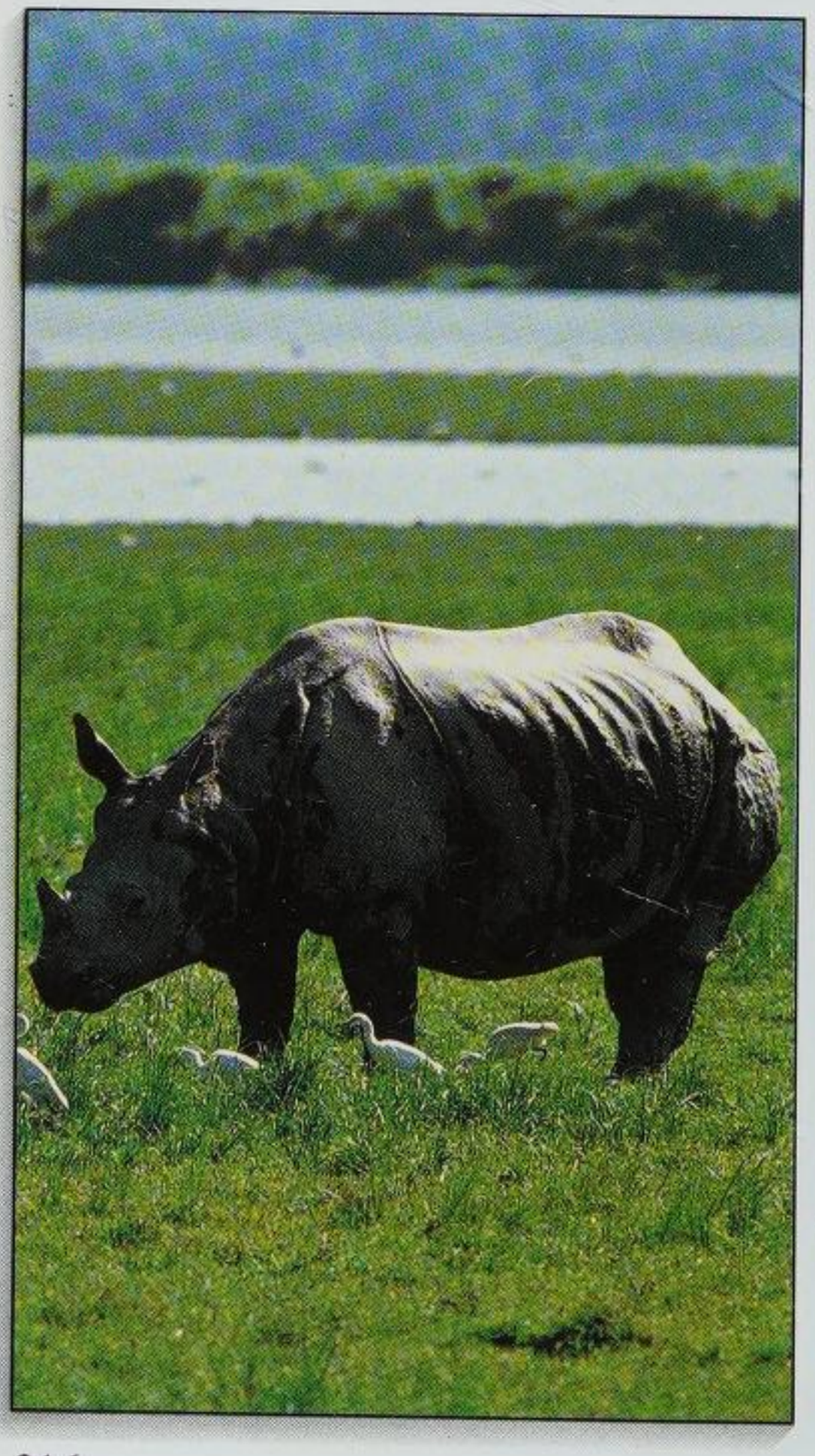
The **wild buffalo** herds in Kaziranga, like the rhino, have also got relatively used to humans and can be approached on elephant-back with little danger. By and large, buffalo herds are shy of humans, and mothers canter off with their wooly calves if threatened. However, solitary bulls are often bad tempered and quick to charge with or without any provocation. If a good elephant holds its ground, the bull will usually pull up short, a picture of wild defiance. These bulls often stay in the vicinity of herds, and sometimes mate with domestic buffalo cows as well. The Kaziranga buffalo have over the years suffered from domestic genes invading the wild stock, and unlike the wild buffalo of Manas, the animals are thought to be feral in most cases.

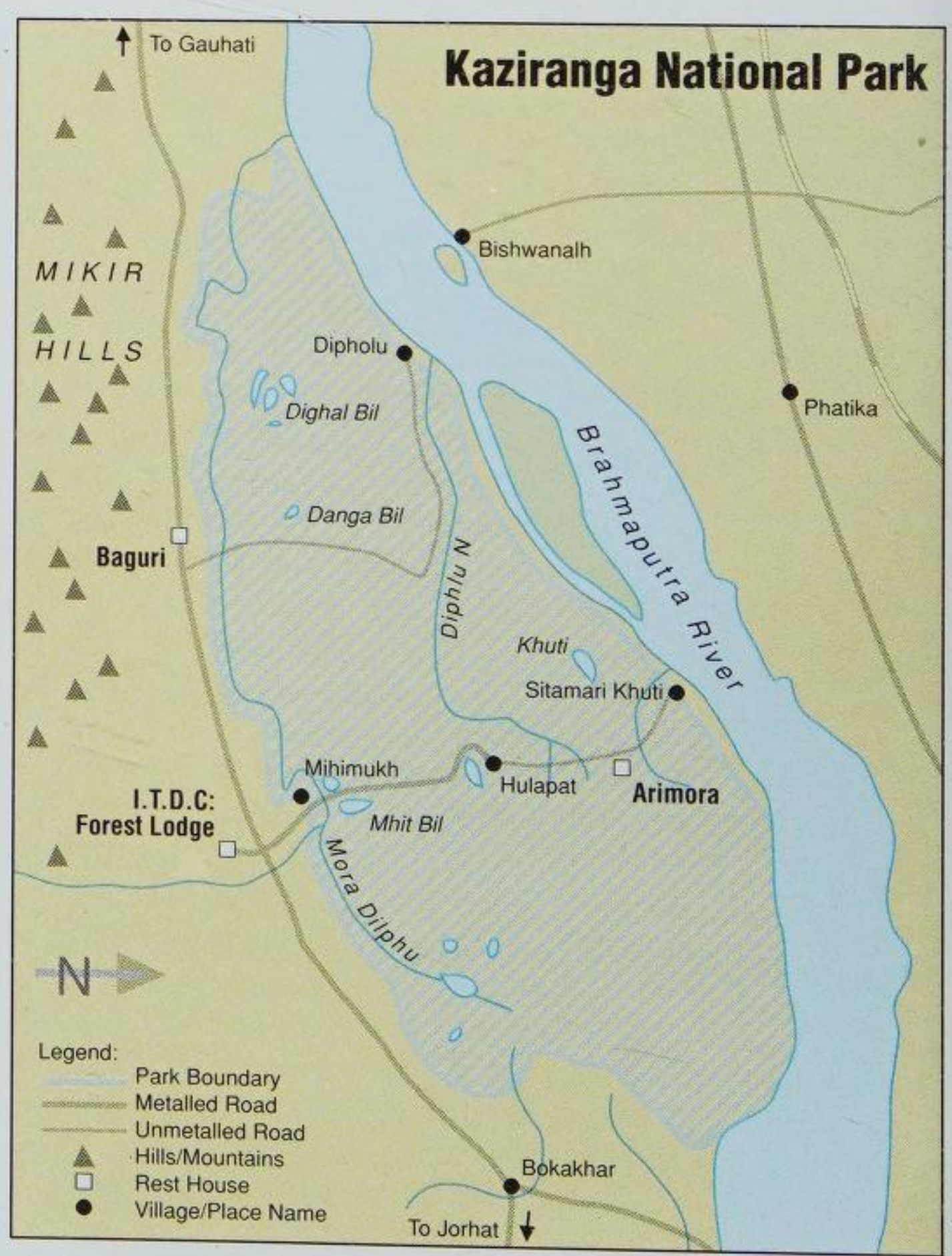
The presence of buffalo and rhino make walking in the sanctuary a difficult proposition. A third species ensure that visitors enter only riding elephants or in vehicles. Herds of up to 200 **wild elephants** can be seen migrating from the Mikir hills to the *bheels* and, like the buffalo, it is again the solitary bull elephant that is prone to create trouble. The large number of untusked males (*mukhnas*) in the northeast often causes confusion, for what is taken to be a large female turns out to be a male. A riding elephant, on occasion, can wander into a herd of wild elephants; on the other hand, a wild elephant will even caress a trained one with its trunk, oblivious of the dreaded human cargo on its back.

As one starts from Mihimukh, the Himalaya, which are more than a hundred miles to the north, can be seen on some days. Small herds of **barasingha** (swamp deer) and the odd **wild boar** are usually among the first animals seen. A subspecies of the barasingha of Kanha and of the other variety found in the *terai* of Uttar Pradesh, these deer of Assam have slightly splayed hooves and are found on high ground in the proximity of water. When the stags are regenerating their antlers, it is not uncommon to find herds in an all-male group.

The **chital** does not extend beyond the Brahmaputra, its eastern range in India being Manas, but there are plenty of **para**, as hog deer are referred to in this region. Mixed

Rhinoceros and cattle egrets.



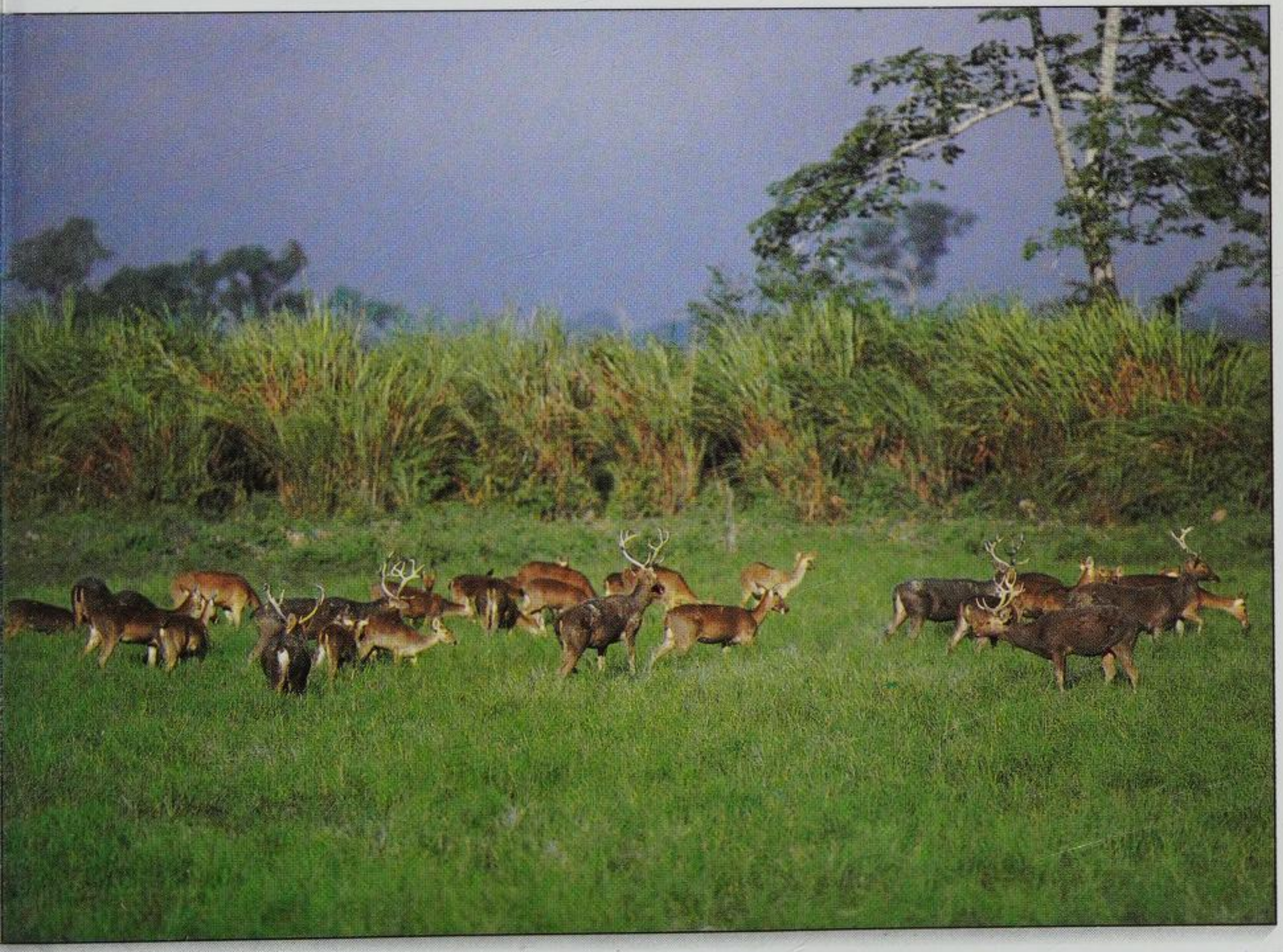


herds, of both sexes, are often scattered around the various *bheels*, and these small deer are among the main prey species of the tiger in Kaziranga. Solitary hog deer are often seen.

Among the other animals found in Kaziranga, the wild boar is fairly common. Some **gaur** (the word *gaur* in Assamese refers to the rhino, while the gaur is called a bison) are also found here, but are scarce and rarely seen. **Leopard cats** and **otters** are not uncommon, while the odd **leopard** may be chanced upon. A wide variety of snakes, including **rock python** are also found while the prehistoric **monitor lizard** is relatively easily seen.

Birds: Grasslands are often excellent raptor country, and Kaziranga is no exception – the **crested serpent eagle** is common, **Pallas's fishing eagle** and the **gray-headed fishing eagle** are frequently seen. Dawn is welcomed by the loud calling of the **swamp partridge**, which shatters the misty silence of the morning, while **red jungle fowl** tentatively step on to a jeep track before taking off at a mad run in front of a jeep. The **Bengal floricab** and a variety of waterfowl, of which the **bar-headed goose** and the **whistling teal** are the most frequently seen, are among the other birds found in the sanctuary. A large number of **pelicans** nest close to Mihimukh on a large semul tree and the clumps of forest are alive with the screeching of the **rose-breasted parakeet** and an assortment of birds common to the northeast. As one would expect, the swamps are home to a diverse avifauna of the shallow watersides. **Black-necked**, **adjutant** and **open-billed stork**, **egret** and **heron** of all shapes and sizes and other waders can be found around the *bheels*, which are clogged with water hyacinth. When this once exotic plant first appeared in Kaziranga, no animal would condescend to feed on it except the wild boar, which ate the roots during the dry season. Now buffaloes as well as elephants browse on it, though somewhat reluctantly.

Firmly entrenched on the Indian tourist map, Kaziranga has its own peculiar problems. Poaching continues to be a major threat to the rhino population, with over 35 animals being killed each year on average. A disproportionate increase in human populations along the highway and the sanctuary has created socio-economic problems that are not easy to tackle and Assam is still tackling the effects of political turmoil. On the other hand, regular transport links have made travel easier, and the northeast is no longer as inaccessible as it used to be.



Swamp deer.

MANAS TIGER RESERVE

Manas: This sanctuary, in contrast to Kaziranga, is far removed from the National Highway and the mainstream of human life passes it by. Barpeta Road, the railhead that also serves as the sanctuary's headquarters, is almost three hours by road or rail from Guwahati. At present the park is closed due to insurgency and it advised that you contact the park authorities before traveling.

Manas has a much longer season than Kaziranga, the only wet period from mid-May to September, but the best period to visit the area is either in November or February. Unlike the open swamps and grasslands of Kaziranga, where the visitor may see a large number of animals, wildlife viewing in Manas is never regular – or easy. But when one is confronted by an animal, it is usually at close quarters and, invariably, exciting and dramatic.

Few places can hold a visitor in its grip the way Manas can. Over 1000 sq miles (2,600 sq km) in area, the Manas river at Mothanguri forms the boundary between India and Bhutan, and one of the great attractions of the park is the **golden langur** that inhabit the park's tall flowering trees.

The topography of the reserve is dramatically diverse: the river spilling out of the foothills; the lower sandy stretches where islands of trees stand like sentinels over herds of **wild buffalo**, with **fishing eagles** and **ospreys** searching the fast flowing streams for fish. There are the great forests of mixed deciduous vegetation, which shut the light off at ground level, and finally small glades of grassland where elephant herds leave their calling card by uprooting every invading sapling that tries to encroach into the glades.

In terms of diversity in animal life, Manas again stands alone. There are twenty species of birds and animals here that are listed under Schedule I (highly endangered) in the *IUCN Red Data Book* , and of these species, some like the **hispid hare** and the **pigmy hog** are today found only here. Both these remarkable animals have been reduced to a rarity, so much so that their extinction was once thought to be just a matter of time. The situation today seems to be less desperate.

As one travels into Manas from Barpeta Road, leaving the long semul-lined drive and the Bansbari tea estate behind, the gravel

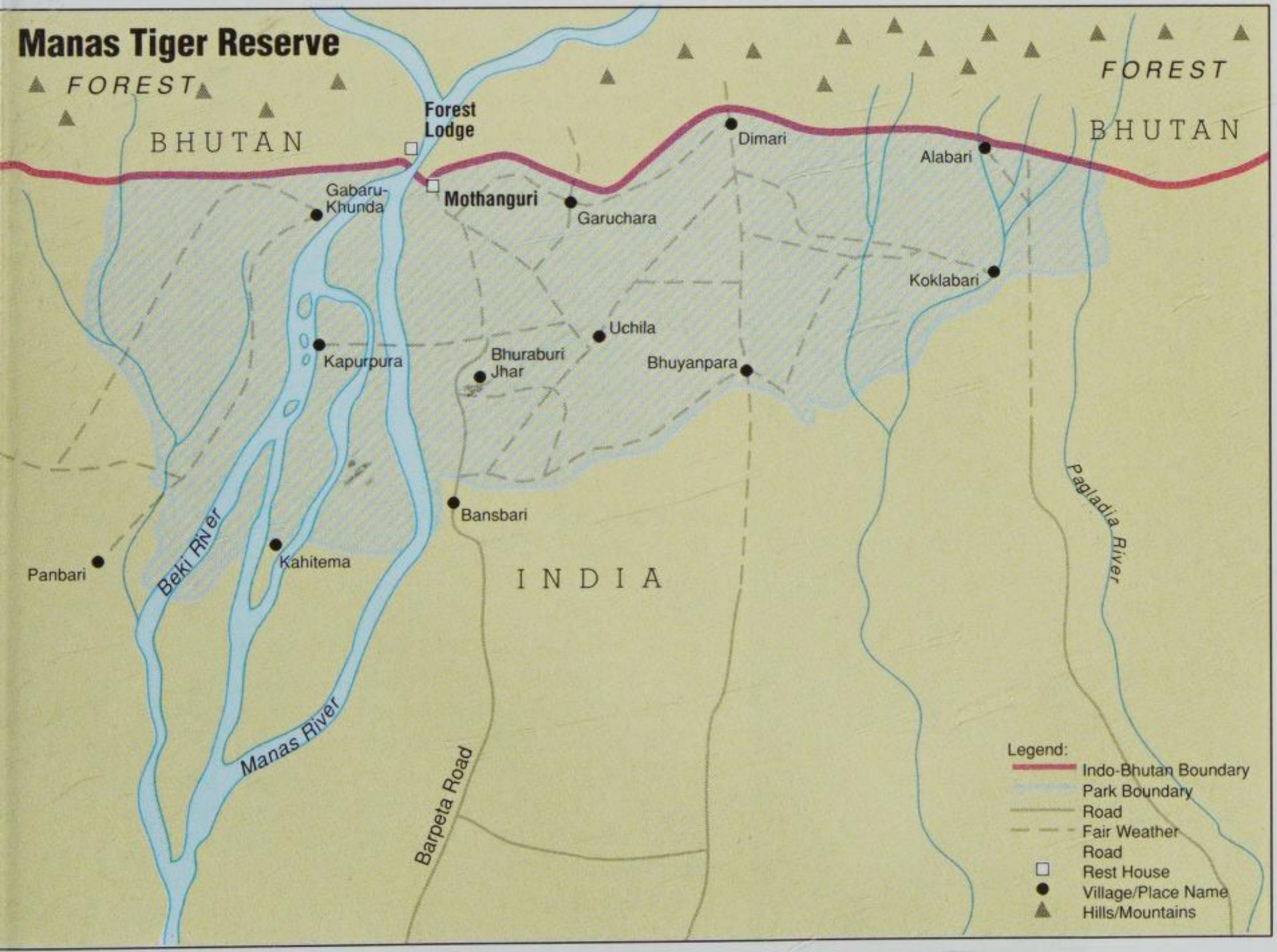
Wild buffalo are restricted to a few pockets in northeast India.

road snakes through open grassland that is said to be prime country for the hispid hare, which is also known as the Assamese rabbit. During the late evenings, just as dusk gives way to darkness, the beam from a vehicle's headlights sometimes spotlights the scurrying figure of this elusive and rare animal.

When the park is open, **Mothanguri** is the best place to stay and although the lodges offer quite basic accommodation, they are clean and in an excellent position. Situated on a rise overlooking the Manas river, there could be few places so endearing to a naturalist. From the balcony of the rest house, one overlooks Bhutan, while on the Indian side the forests are tinged with pink, especially in February when the semul trees are explosions of color. The Project Tiger people have a number of riding elephants that provide the ideal means to move about and give the visitor the best approach to wildlife, but the saddles or *howdahs* are quite different from the broad seats of North and South India. Here, one needs to straddle the animal or sit sideways on the saddle, which can be a little painful after a while. Red ants, notorious for a rather painful sting, drop onto you from their leaf nests in trees, and there is little one can do other than watch out for them.

While the golden langur are usually approachable on foot from the boat landing on the Bhutan side, the colorful **capped langur** is only approachable from elephant back. Extremely shy, these primates usually move away, but if one were to watch them quietly for half an hour, they seem to forget your presence and go about their business of eating and grooming with the nonchalance so typical of the langur family. The **Assamese macaque** is rarely seen in the forests, but they inhabit the islands downstream and move in large troupes from place to place. The **slow loris** and the **Hoolock gibbon** also extend into Manas, but sightings are rare.

Most of the animals found in Kaziranga are also found in Manas. **Rhino** is not as plentiful, but a reasonable population exists, but here these animals are extremely shy and make off at the slightest disturbance, using the heavy undergrowth to their advantage. Two of the main attractions, however, are the **water buffalo** and the **elephant**. The ideal way to observe buffalo is to try and hire a boat at Mothanguri and spend the better part of the day drifting downstream before being picked up by motorized transport some 22 miles (35 km) away. The herds come to the river during the day to cool off and they stare curiously at the drifting boat, their



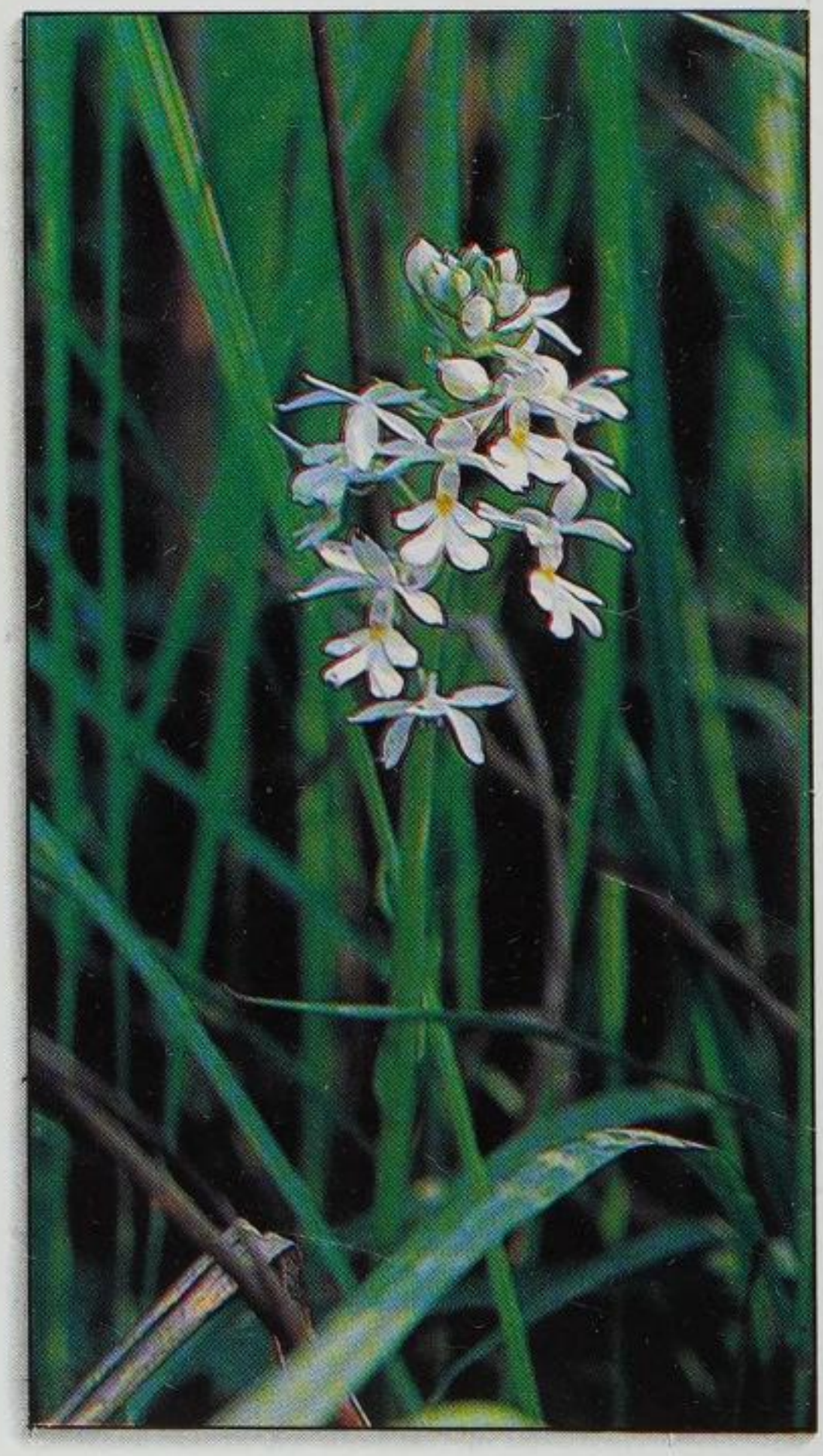
sweeping and majestic horns thrown back in graceful arcs. The lone bull, eager to maintain his territory, will toss his head as only a bull can and sometimes he will follow along the side, presenting a sight that is rarely forgotten. On elephant-back too, one sometimes succeeds in surprising a herd in the water, which then struggles to the bank through the mist and the water. Locating elephants in the thick forest is never an easy task, but once a herd is found, the riding elephant often manages to get into the herd. To be surrounded by a herd of trumpeting wild elephants can leave one weak around the knees, and to be charged by a lone bull is by no means an uncommon occurrence here. Fortunately, the trained elephants are adept at making a quick getaway, but the image of a charging tusker with its ears fanned out is a memory that never fades.

A lot more elusive and shy is the **Indian bison**, or **gaur**, which stands taller than a buffalo at the shoulder. Sometimes, one can see a large herd in the grassy glades, but at the slightest sound or movement, they thunder off into the cover of the forest. Another method of looking for gaur is to drive along the foothills on jungle tracks that are hemmed in by tall grass on either side. The area is full of **hog deer** and sometimes a **tiger** can be seen plodding along the tracks, looking for a chance to kill. This stretch is good for the other big cats too. When fires are lit to burn the grass, a **clouded leopard** may emerge from behind a smoldering tree trunk where he had been feeding off insects that are forced out by the smoke. Manas provides an ideal habitat for the **sloth bear**, yet another species inseparably linked with Manas, and they too can usually be seen at dawn or at dusk. In fact, the sloth bear is often seen when the light is too poor for photography. Picked up by a spotlight, it will scuttle away but sometimes curiosity gets the better of him, and animals will come close to the jeep, staring at it with myopic eyes.

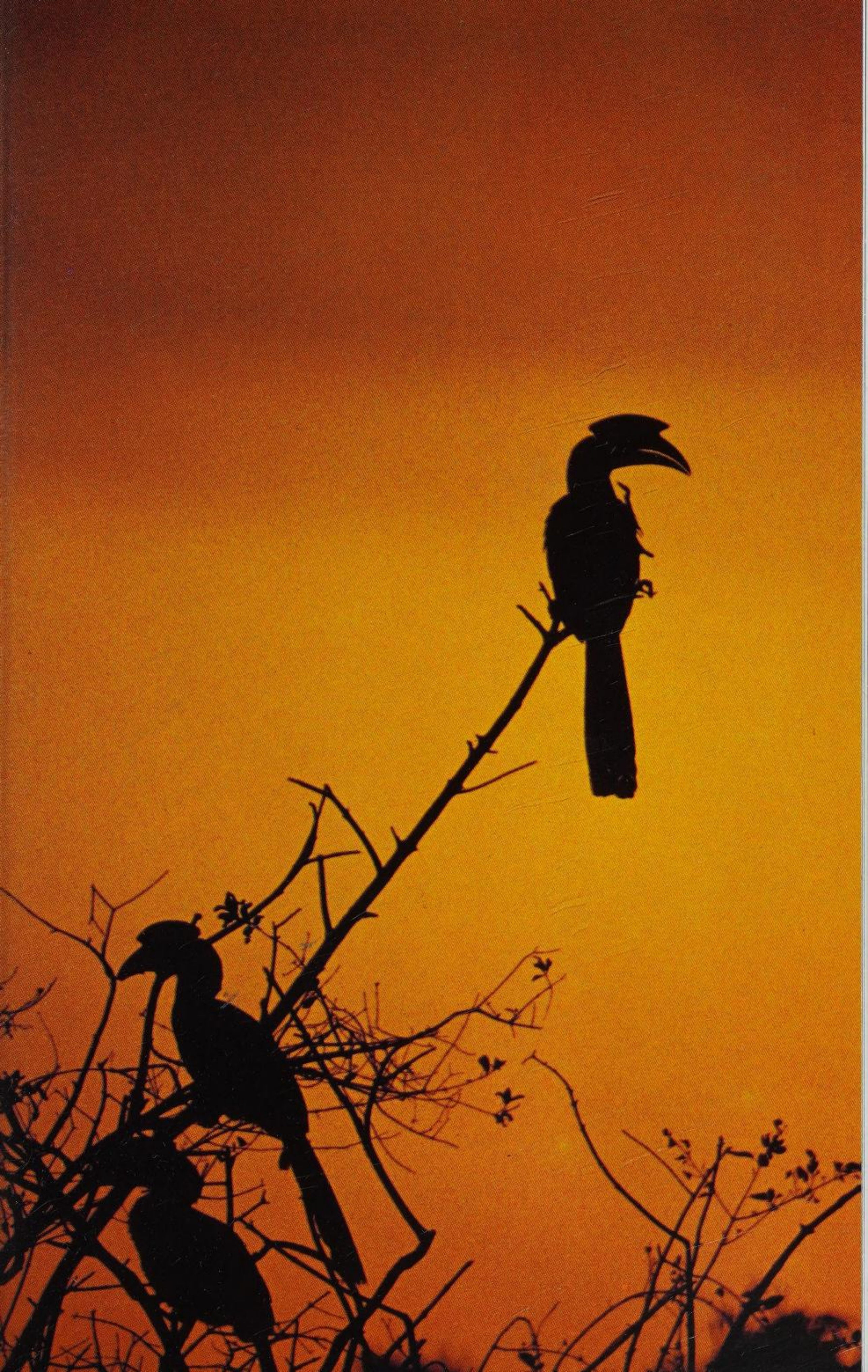
Manas is the eastern range of **chital**, but the Field Director of the park fears that the small surviving population is hardly breeding for reasons that are not known. The **muntjac**, or **barking deer**, **hog deer**, **sambar** and, in places, **swamp deer**, represent the deer family in fairly good numbers. The sambar is perhaps the most widely distributed of all Indian deer and though only one species is recognized, there are changes in color and the average size of antlers from one region to another. If one were to sweep across the top half of India from west to east, the Rajasthan sambar is a dull brown, which changes to a slightly deeper shade of red as you approach Bihar, which also has some of the best stags. The reddish tinge gets even more pronounced as we move further east. Another notable thing in Manas is the raw patch sambar develop on their throat – it looks quite a bit like a sore. This interesting phenomenon is common to all the large deer in eastern India.

For insects, butterflies and reptiles, the northeast is prime country and the blaze of color at ground level in the jungle holds one in breathless wonder. In the canopy above, winged stars steal the show; **scarlet minivets** flash their orange and yellow towards the watching heavens; a **bee-eater** clicks its beak as it grabs a bee; **magpie robins** and **bulbuls** fill the air with their constant chatter. But the main attraction is the **giant hornbill**, which whooshes its way from tree to tree. Two subspecies of the giant are found here along with the **pied** and the **gray** varieties, sharing more or less the same habitat. **Red jungle fowl** and **kaleej pheasants** scratch for their food from under the fallen leaves, while the great river offers ornithologists its own brand of avifauna with **mergansers** and **brahminy ducks**, **egrets**, **pelicans** and **herons**, **eagles**, **falcons** and **harriers**.

Manas undoubtedly is a very special place.



Left, ground orchids and right, hornbills.



KEOLADEO GHANA NATIONAL PARK (BHARATPUR)

Only 110 miles (176 km) from Delhi and 31 miles (50 km) west of Agra and the Taj Mahal, Keoladeo Ghana is a wonder of the natural world no less worth seeing than the marble tomb of Shahjahan's queen. Over 350 species of birds find a refuge in the 11 sq miles (29 sq km) of shallow lakes and woodland that makes up the park. A third of them are migrants, many of whom winter in Bharatpur before returning to their breeding grounds as far away as Siberia and Central Asia. Some 120 species nest in the park and the heronry at Keoladeo Ghana is said to be one of the finest in the world. The park is open throughout the year, although most visitors choose to come between the months of October and March when wintering wildfowl assemble in their thousands on the lakes or *jheels*.

Preceding pages, egrets in flight. Left, sarus cranes pair for life.

History: While many of India's parks have been developed from the hunting preserves of princely India, Keoladeo Ghana is perhaps the only park where the habitat has been *created* by a maharaja. The park, a mile or so from Bharatpur town, still commonly known as "Bharatpur" rather than by its official name, is the handiwork of the royal family of Bharatpur. The maharaja developed the area in the late 19th Century. Until then it was no different from the arid scrub woodland of the surrounding countryside except that it formed a slight depression, which collected rainwater during the monsoon and attracted wildfowl for the period before it dried up. The maharaja recognized the area's potential and augmented the water supply by diverting water from a nearby irrigation canal. He also constructed small dams, dykes and shooting butts to turn the area into the finest wildfowl hunting preserve in north India. In a few years the new ecosystem so flourished that it was able to support thousands of water birds.

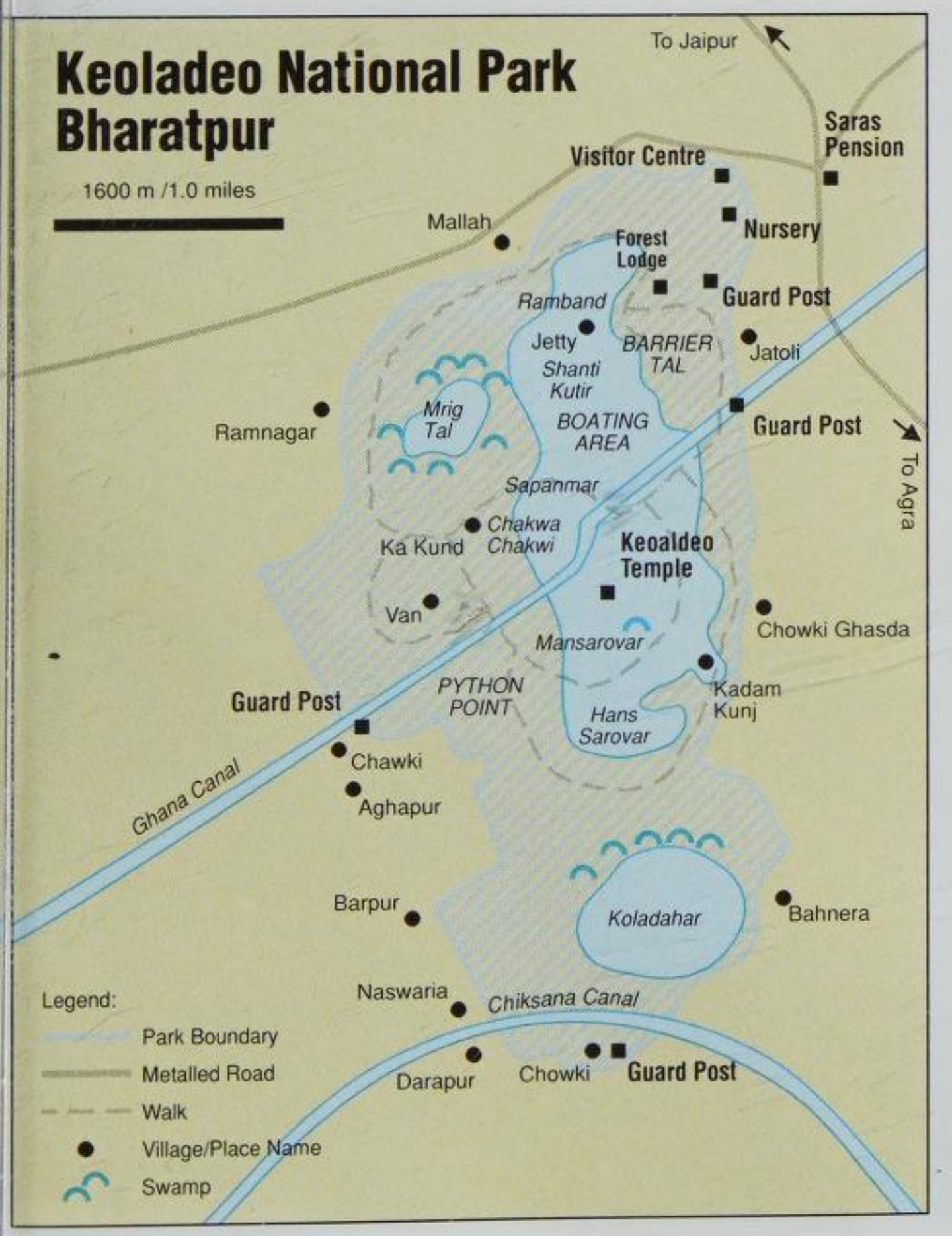
The maharaja celebrated his success in style, with extravagant shooting parties for the murderous dignitaries of British and princely India. Their kills are recorded to this day on a sandstone inscription in the park.

Perhaps surprisingly, the birds survived these depradations and still came to Bharatpur in huge numbers. In 1956 the hunting preserve became a sanctuary, but the VIP shoots continued until 1964 and the maharaja himself retained his personal shooting rights until 1972.

The end of the shooting parties did not mean the end of Bharatpur's problems. The viceroys and maharajas were replaced by a large number of tourists and hundreds of domestic cattle and buffaloes belonging to local villagers. In order to control these problems Bharatpur was upgraded to a national park in 1981 and renamed Keoladeo Ghana. Keoladeo is the name of the ancient Hindu temple devoted to the god Shiva that stands in the center of the park. "Ghana" means dense, referring to the thick forest that used to cover the area.

Geography and habitat: Keoladeo Ghana lies 1,214 ft (370 meters) above sea level and, besides the wetland for which it is famous, contains various other habitats from woodland, scrub and pasture to denuded saline patches. The lakes are fed entirely by rain and river water brought by canal from the Gambhir and Banganga rivers. In the monsoon some 4 sq miles (11 sq km) of the park can be inundated. One waterway, the Ghana Canal, bisects the park, running northeast to northwest.

One main metaled road runs through the center of the park from the northern entrance, through the main wetland area on the



eastern side of the park, where it follows the course of the Ghana Canal. At intervals along the road raised paths lined with babul trees *(Acacia nilotica)* lead off into the wetland. Babuls are the dominant tree in the park and these paths and undergrowth along them provide excellent blinds for birdwatching. There are many good paths in the park and several trails, beginning and ending at various points on the road, are recommended to visitors.

Bharatpur forms part of the vast Indo-Gangetic Plain and its climate is therefore hot in summer (max 116°F/47°C, min. 95°F/35°C), humid in the monsoon (July–September) and comparatively cool in the winter (max 95°F/35°C, min 41°F/5°C), becoming quite chilly at night. Average annual rainfall is 26 inches (66 cm).

Flora: Keoladeo Ghana contains a bewildering variety of flora representing 64 families, 181 genera and 227 subspecies. Besides the babul, other native species of tree include ber, kalam, khajur and khejri. Dozens of species of grasses and reeds abound, providing rich grazing for birds and mammals alike. The wetland habitat of the park has been described by the naturalist, Anne Bastille, as "a living soup of frogs, toads, water snakes, snails, leeches, turtles, pondweeds, carp, water hyacinth, catfish, water beetles, duckweed, lilies, protozoans, wild celery and plankton." Even this description is by no means a comprehensive list of ingredients. Among the fish are **rohu** *(Labeo rohita)*, **bata** *(Lebeo bata)*, **calbasu** *(Labeo calbasu)*, **catla** *(Catla catla)*, **mrigal** *(Cirrhina mrigal)* and **sarana** *(Barbus sarana)*. Some grow to a good size and a 33 lb (15 kg) sarana has been caught in the park. Predatory fishes include **murrel** *(Ophocephalus strictus)* and **freshwater shark** *(Wallago attu)*.

Visiting the park: Although many people visit Bharatpur for the day, it is recommended to stay at least one night in one of the hotels, which provide accommodation within or just outside the park. This gives the visitor the chance to see Keoladeo Ghana at its best – in the early morning and evening. Entry tickets to the park are available at its main entrance. One can drive motor vehicles from the entrance as far as the **Forest Lodge** and the offices of the warden located in **Shanti Kutir**, formerly a hunting lodge of the maharaja. However, from there on, the only vehicles allowed are bicycles and cycle rickshaws. Both are available for hire from the Forest Lodge and the "rickshaw wallahs" take a genuine interest in the birdlife and

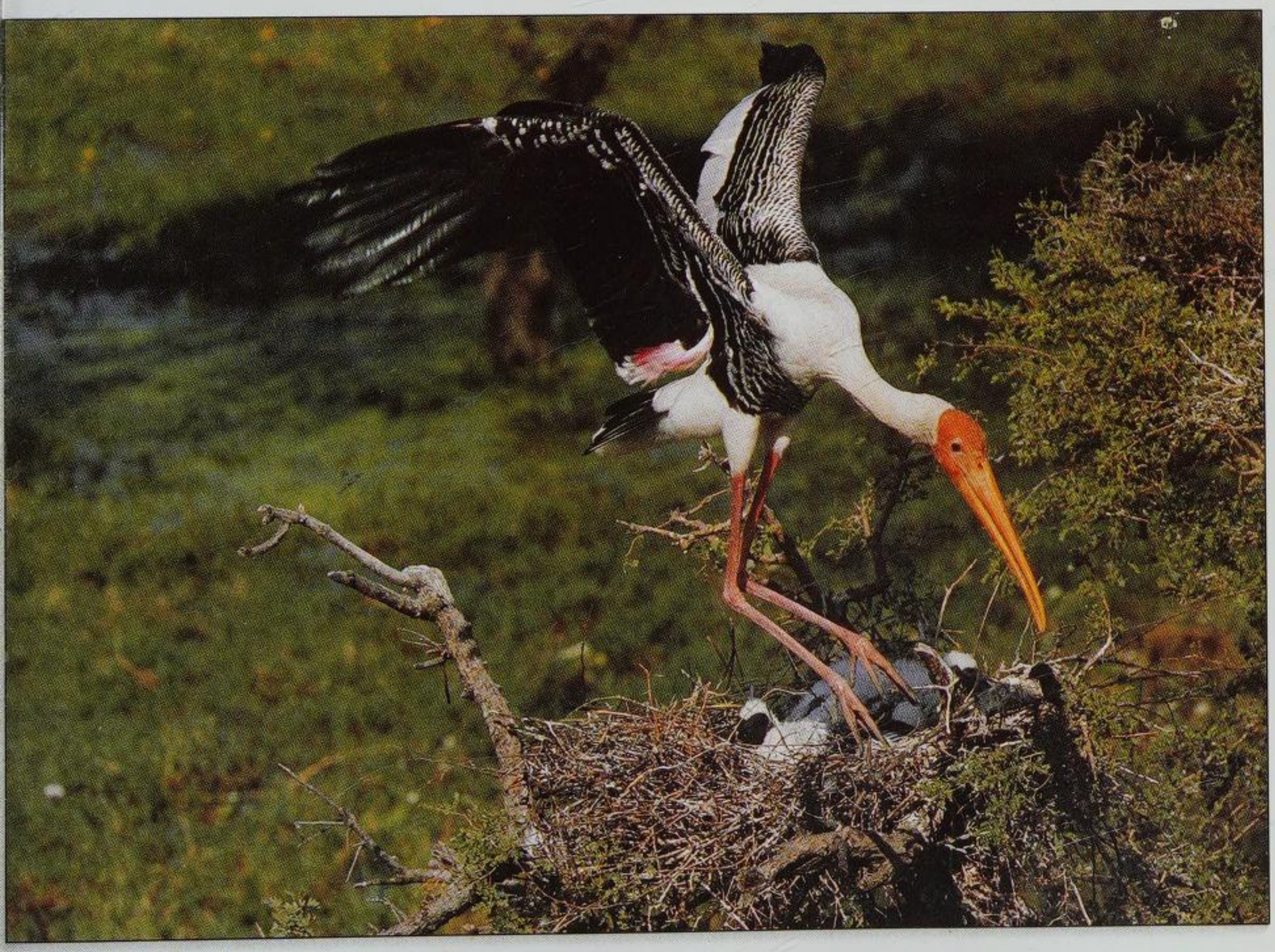
Bharatpur during monsoon.

have been trained to recognize the different species. Boats are also available to take groups of visitors on a circular tour of the wetland starting from the jetty near Shanti Kutir, and a boat trip shortly after dawn is perhaps the most enchanting introduction to the park.

At the start of the peak tourist season in October the heronries are still occupied, although breeding begins shortly after the onset of the monsoon. Thousands of birds nest together in mixed heronries, dominated by different species in different parts of the sanctuary. Some of the most spectacular heronries are situated near the road and can be approached by the raised paths running off it. The crowded and noisy colonies are constructed in babul trees that stand half submerged in water. As many as eight or nine species of birds may nest in one tree. **Painted storks**, **white ibis**, **openbills**, **spoonbills**, **egrets**, **herons**, **cormorants** and **shags** are in abundance, while thousands of **moorhens** and **jacanas** breed in the floating vegetation on the water surface. The amount of food necessary to support the heronries is enormous. It's been estimated that 2,000 painted storks breeding in an area of no more than 1 sq mile (2.5 sq km) require 4–6 tons of food each day to support themselves and their nestlings. In the 30 to 40 days they breed they consume at least 1,200 tons of food – and this is only one section of the population of one species breeding in the park. The painted storks, like many other birds in Bharapur during the monsoon, are local migrants that come to the park between July and October to breed.

In October birds from further afield gradually begin to arrive. Among the ducks, geese and waders that come to Keoladeo Ghana are **gadwal**, **wigeon**, **shovelers**, **garganey**, **marbled**, **common** and **falcated teal**, and the **red-crested**, **common** and **white-eyed pochard**. Unmistakable as they fly overhead are the musical **whistling teal**. **Greylag** and **bar-headed geese** also appear in large numbers and waders include various species of **plover**, **sandpiper** and **snipe**. Two species of **pelican**, the **rosy** and **dalmatian**, join the resident **gray pelican**.

The Bombay Natural History Society carried out a program of ringing birds at Keoladeo Ghana. Common teal, garganey and wigeon have been recovered in the former-USSR as far as 2,858 miles (4,600 km) away. A shoveler was found in Samarkand, and ruff and reeve as far as 3,635 miles (5,850 km) away in Yakutian in Russia. The ringing operation has also



Painted stork.

provided evidence that has helped to prove that Keoladeo Ghana is a staging post for many migrants who build up their reserves of fat in the park before departing for their final destinations in places such as South India.

Besides the waterfowl, there are many terrestrial migrant species. **Warblers**, **pipits**, **wagtails** and **buntings** are also winter visitors. But of all migrants the most sought-after is the **Siberian crane**.

There are only two wintering places left for the western race of this extremely rare species. One is in Feredunkenar in Iran and the other is Keoladeo Ghana. The journey to Bharatpur takes them 3,977 miles (6,400 km) from their breeding grounds in Siberia. They arrive in December and stay until early March. These impressive, pure-white birds, with their black primaries and crimson bills and facial patches, are one of the four types of crane in the sanctuary.

The **demoiselle** and **common cranes** too are visitors, the **sarus** being the only resident. Unlike other Indian cranes, the Siberian crane is entirely vegetarian. It feeds on underground aquatic roots and tubers in loose flocks of five or six. Some birds, however, remain in their breeding pairs and establish their own territories. They see off intruders with a spectacular display, throwing their heads backwards and forwards, accompanied by loud cries. These pairs often have one chick with them on arrival whose immature brown and white plumage changes to pure white and black during the winter. The inability of these crane to produce more than one chick is one reason given for their scarcity.

Although Siberian cranes had been known to visit India for centuries (Ustad Mansur, a court artist of the Emperor Jahangir, made a detailed painting of the crane in the 17th century), it has never been a common species.

Many species at Bharatpur are specialist feeders like the Siberian crane. It is this that allows so many birds to flourish in such a small area. Each helps itself to one ingredient of the wetland soup. Flamingos sieve the water for plankton, spoonbills rake the mud with their lower mandibles for mollusks, tadpoles and weed, while egrets and herons spear their prey, and geese and brahminy ducks graze at the water's edge.

An indication of the strength of the food chain in the sanctuary is the number of birds of prey, migratory and resident, which it contains. At least 32 species of birds of prey and seven species of owl have been observed. Among notable migrants are the

Spoonbills.

steppe eagle, **pale** and **marsh harriers**, **osprey** and **peregrine falcon**. Resident Indian species are no less striking. These include the **tawny eagle**, **ring-tailed fishing eagle**, **crested serpent eagle**, and **Brahminy** and **black-winged kites**. Four species of vultures can be seen, notably the less common **king** or **black vultures**.

The migrants leave for their breeding grounds around March, when many of the small, terrestrial birds in the park are preparing to nest. Even without migrants, there are many birds still to be seen and, although the spectacle of the winter season is missing, the visitor has the pleasure of having the park more or less to themselves. Egrets, herons, cormorants, storks, plump purple **moorhens** and elegant pheasant-tailed jacanas are all residents.

Pied kingfishers hover dramatically overhead before plunging into the water after their prey and **darters** perch like cormorants, hanging their wings out to dry. In the hot weather, before the monsoon breaks, **red-wattled lapwing** and **stone curlew** hatch their eggs in well-camouflaged nests on the ground, and pairs of **sarus cranes**, seen in India as symbols of fidelity, perform their courtship dances. Terrestrial birds too are in abundance. At the onset of the monsoon, **weaver birds** begin to construct their elaborate pendulous nests from date palms and other trees.

Mammals and pythons: The most easily sighted of the mammals at Keoladeo Ghana (besides the lively little ground squirrels) are the sounders of **wild boar**, which root around the jungle near the Forest Lodge and in thickets. **Sambar** and **nilgai** can be seen near or in the shallow waters of the wetland, although **chital** or spotted deer are restricted to the park's dry area towards the south and west. There is also a small population of **blackbuck**. Rhesus macaques and langurs are present but not encouraged by the authorities.

The common **mongoose** can often be seen running across the road or in the undergrowth at its edges, and smooth **otters** are another attractive and entertaining animal to look out for on the lakes. Three types of wild cats, the **jungle**, **leopard** and **fishing cat**, are present as are the **Indian** and common **palm civets**. **Jackals** can be very vocal at night and striped **hyenas**, **foxes**, **porcupine**, **hare** and a variety of smaller mammals have also been seen.

A bonus to visitors fond of reptiles are the large **rock pythons** that can be seen sunning themselves, especially at **Python Point** beyond the Keoladeo Temple.

grets and
ainted storks.

वन विभाग राजस्थान सरकार

कार्यालय

क्षेत्र निर्देशक

रणथम्भौर राष्ट्रीय उद्यान

बाघ परियोजना, सवाई माधोपुर (राज.)

RANTHAMBORE NATIONAL PARK

The great jungles of Central India were an awesome gift of nature that have been vandalized and largely destroyed over the years. What survives is but a small portion of its northwestern extremity.

This region, with its relics, is a historically important reminder of the misty past. The fort of Ranthambore was the center of a Hindu Kingdom that was beseiged by Allaudin Khilji's army in 1301 AD. He later defeated its king, Raja Hamir, and the Rajput women are reputed to have committed the terrible ritual of *sati* in the fort.

However, the area soon slipped back into the hands of the Rajputs and again became a powerful kingdom. The Mughal Emperor, Akbar, attacked it in 1569, the year after he took the fort at Chittaurgarh, and conquered it in 40 days of warfare. The event was important enough to be commemorated with five magnificent miniature paintings by the emperor's renowned artists, Miskina, Paras, Khem Karan, Mukund, Shankar, and Lal, in the imperial copy of Abul Fazl's *Akbar Nama*, the official chronicle of Akbar's reign.

The Kachchwaha rulers of the principality of Amer (later known as Jaipur state) received the fort from the Mughals and it remained with them till 1949 when Jaipur state was merged into Rajasthan. The forests around the fort, then known by the name of the nearby township of Sawai Madhopur, were the private hunting grounds of the Maharajas of Jaipur. Among the most infamous of their hunting parties was one organized for Queen Elizabeth II and the Duke of Edinburgh in 1961 – by which time royalty, both local and visiting, should have known better. It was due to the desire to preserve game for sport that the forest and its inhabitants first received protection and thus survived long enough to be rescued by Project Tiger.

In 1972, it was estimated that there were 1,927 tigers in India, of which Rajasthan had 74 and the number of tigers estimated in the Ranthambore Sanctuary's 60 sq miles (155 sq km) was 14. That year saw the launching of Project Tiger and this sanctuary, named after the fort, became one of the eight sanctuaries and national parks of the new project. Over the years, the sanctuary has become a national park with a core area of 158 sq miles (410 sq km) with a tiger population of 40 according to the 1986 census, but with poaching – which has become a severe problem – the number is presently thought to be around 30. In 1984, an additional area of 40 sq miles (104 sq km) of adjoining forest was designated the Sawai Man Singh Sanctuary, after the late Maharaja of Jaipur.

Friendly tigers: Ranthambore is famous for its **tigers** and justly so. Over the last few decades tigers have become more and more active during the day, thus giving the lie to the earlier belief that they are nocturnal animals. More than in any other park or sanctuary in India, tigers are now encountered here in broad daylight. They have lost some fear of humans and seem quite unperturbed by their presence.

Besides hunting in broad daylight as well as at night, some other unique aspects of tiger behavior have been observed and photographed. Once, for instance, a magnificent large male hunted openly from the thickets on the edge of the lakes and ran down its sambar prey in the water. A tigress too indulged in similar behavior. There have been instances when a tiger and a crocodile from the lake have confronted each other. On one memorable occasion a tiger battled with a crocodile over a sambar carcass and finally took possession of it in broad daylight, after a long fight.

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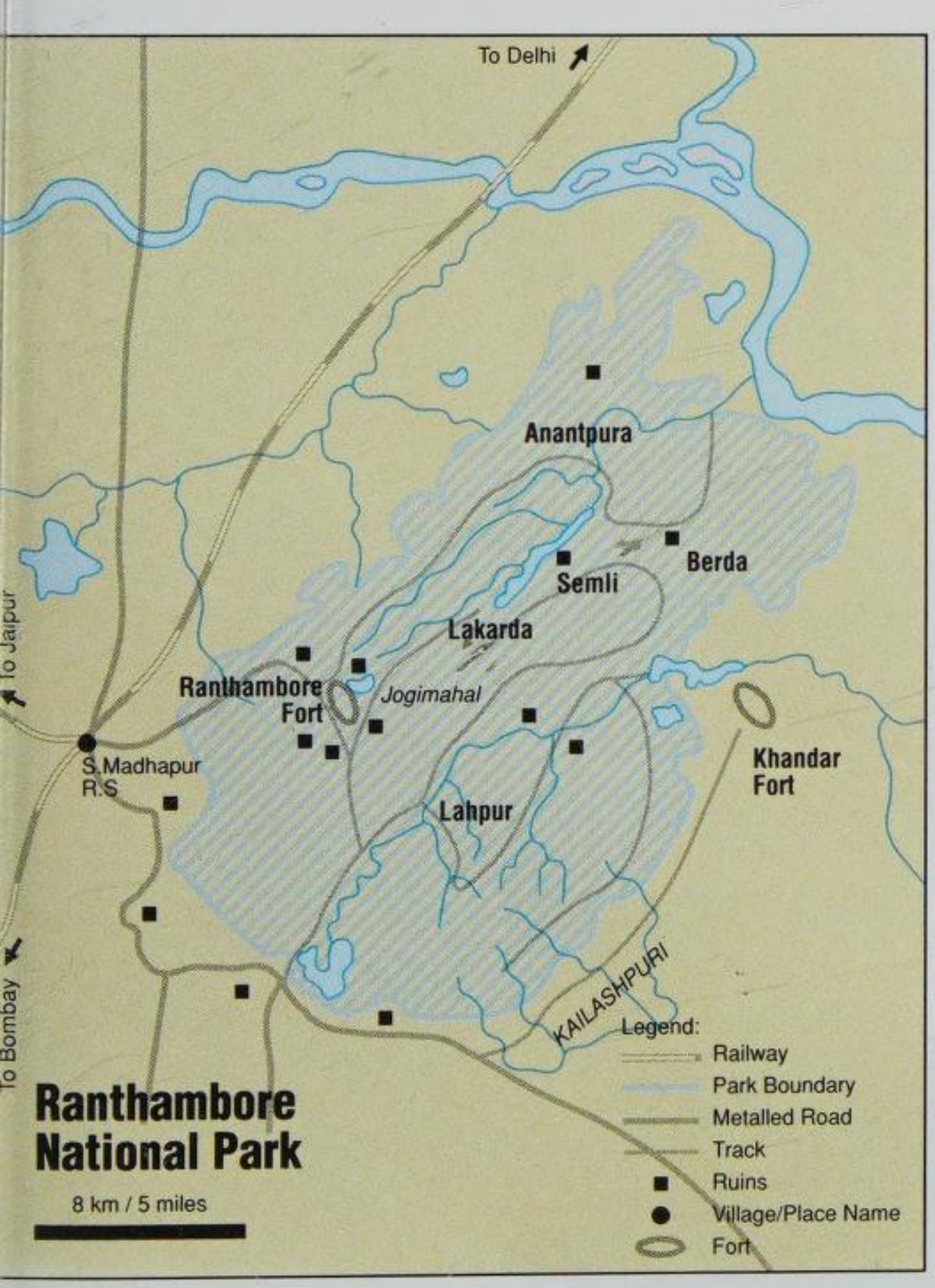


It was generally believed that tigers are solitary creatures and only the mothers take care of their cubs so long as these are unable to care for themselves, and tigresses with cubs were seen only rarely. Here too their behavior seems to have undergone a change. In 1986, two tiger families, one with two cubs and another with three, were extremely trusting of human presence in jeeps and were observed for long stretches of time in jungle clearings in broad daylight, even when the cubs were a few weeks old. The family with three cubs include a large male, which seemed to have chosen to live with the cubs without being aggressive. In fact, this male was also seen with another tigress in the same Bakaula nala region from time to time.

Because of such tiger activities, Ranthambore is probably the best park in which to photograph them. In recent times it has become a center of attraction for wildlife photographers from all over the world. Sighting a tiger can never be a sure shot, but here one comes as close to it as it is possible.

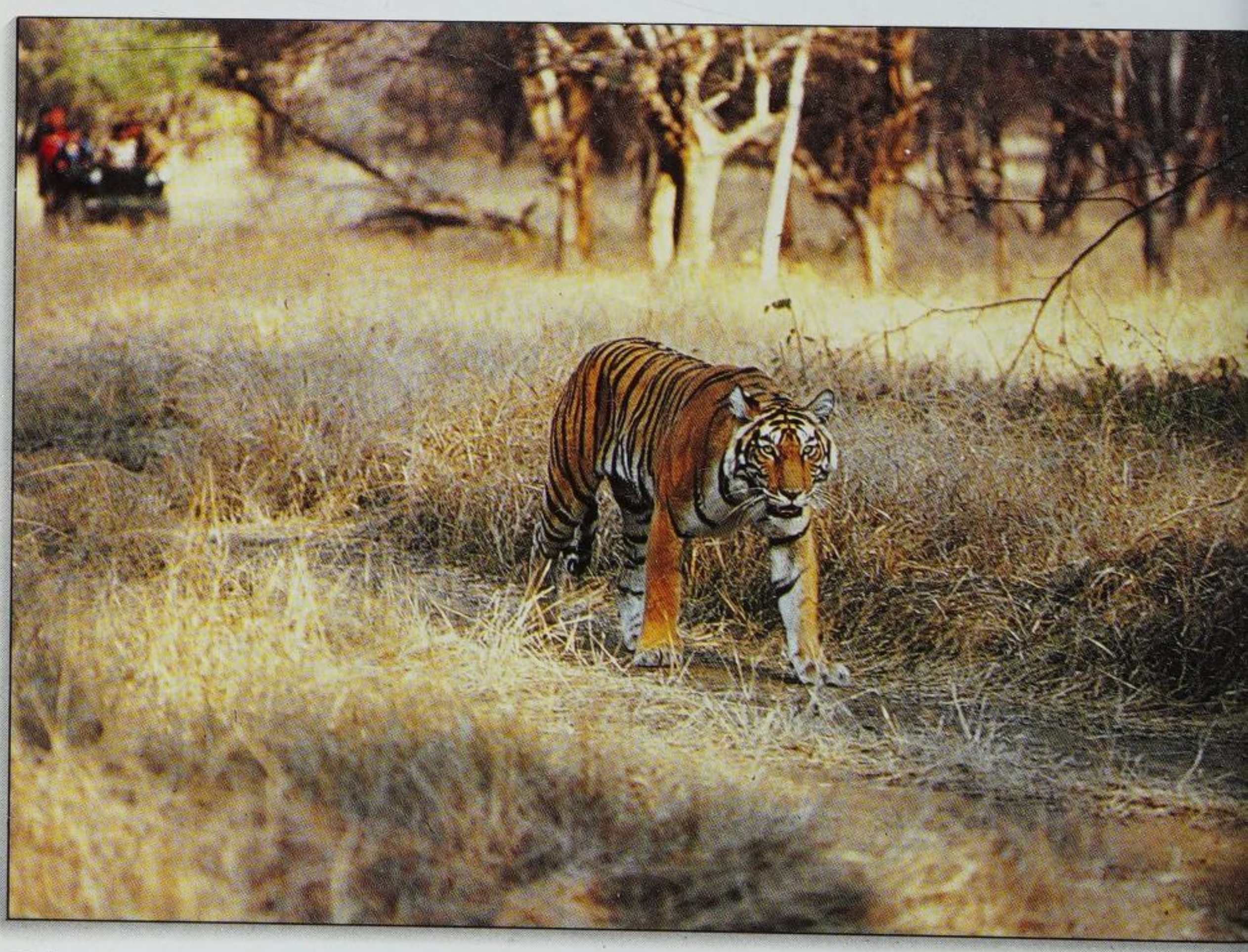
Other predators: This park also has a large population of **panthers**, which are the second largest predators of this forest. The prey species of tigers and panthers overlap, and because of possible conflicts between them, the latter are found more often on the periphery of the park. **Kachida valley** accounts for the highest number of sightings of these cats. They do not appear to be as fearlessly diurnal as tigers have become and therefore their sightings are not as frequent.

Another interesting feature of the park is the visibility of **marsh crocodiles** in and around the lakes. Over the years, their number has increased and these reptiles, 8–10 ft (2.5–3 meters) in length, are not uncommon. They are easily seen in the water or basking on the shore of the lakes. Often they are seen crossing from one lake to another. Interestingly, they eat dead sambar on land and try to drag the carcass into the water, even during daylight hours.

Other predators in Ranthambore are **hyenas**, **jackals** and **jungle cats**. **Caracal** too have been recorded. The last sighting of wild dogs was way back in 1954; it is not known why they have disappeared from these forests completely.

Ranthambore has **sloth bears** that one may encounter while driving through the park. **Lakarda** and **Anantpura** are the areas where they are seen most often.

Sambar are seen everywhere and in large herds around the lakes. They are in hard horn



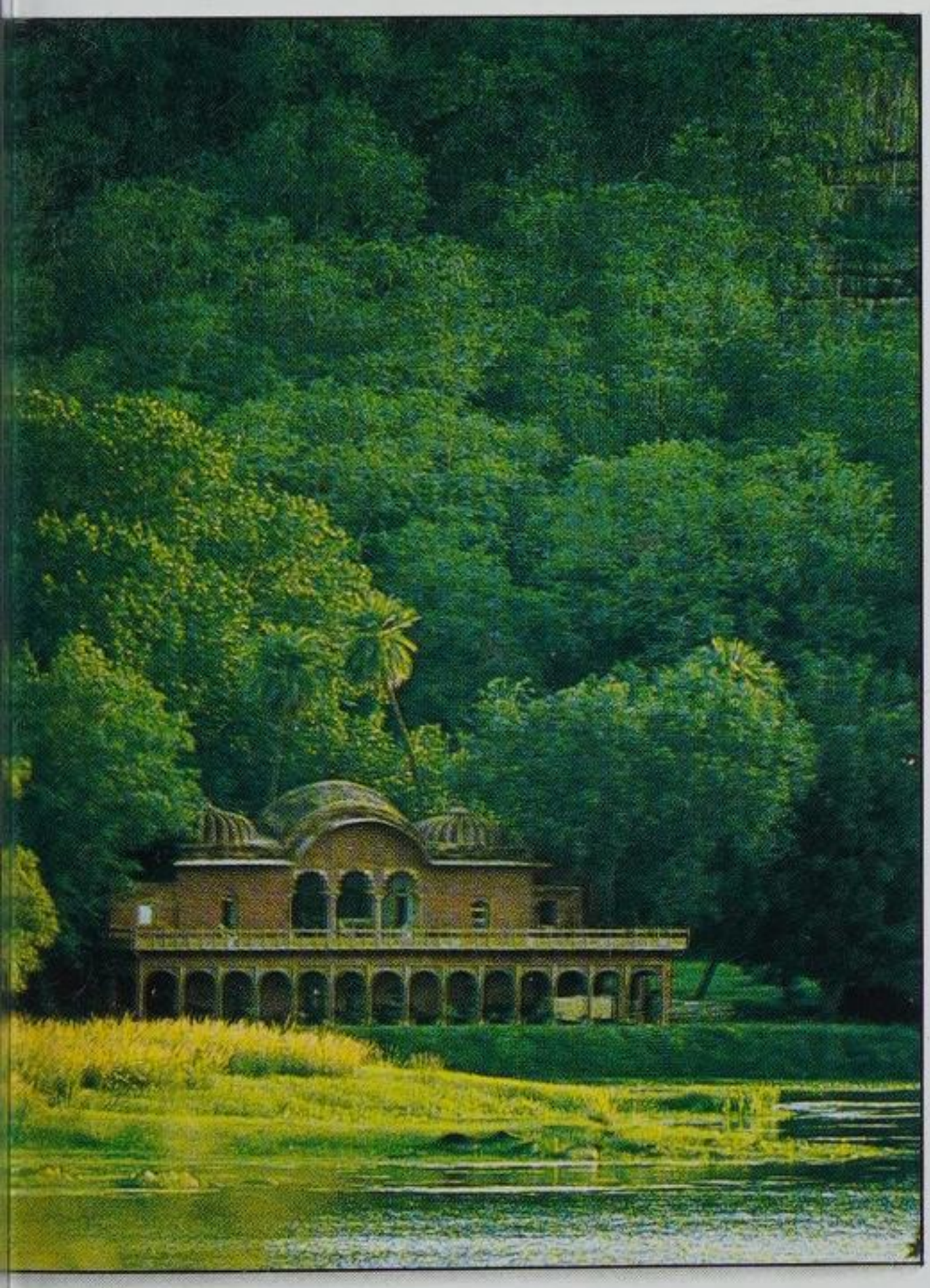
An evening jeep ride.

and at their best during the rutting period in the winter months, though their antlers tend to be smaller than those of their counterparts in Central India. Sambar are known to wallow in and like water, but here they can be observed in water for hours, eating and swimming in the lakes. Behavior one would expect from barasingha rather than sambar.

Chital are extremely common throughout the park and they come to water in their hundreds particularly in the warmer months. **Nilgai** too are found all over the park with the greatest concentration around the lakes; they roam in smaller herds than those of sambar and chital.

Sounders of **wild boar** can be seen around the lakes with an occasional **chinkara** (Indian gazelle) also coming along. Among others, **Indian hare** and **mongoose** are most visible on the edge of the water. **Monitor lizards** are common though shy; they are usually quick to notice vehicle movement and, by the time one notices them, they are scampering off to their burrows.

Though this park is famous for its animals, it is rich in birdlife as well. **Bonelli's eagle**, **crested serpent eagle**, **great Indian horned owl**, **gray partridge**, **painted partridge**, **sangrouse**, **quail**, **spur fowl**, **common pea fowl**, **tree pie**, **paradise fly-catcher**, **pheasant-tailed jacana**, **painted stork**, **black stork**, **white-necked stork**, **spoonbill** and **green pigeon** are among the resident birds of the park. In addition, during the winter months, the park receives migrant visitors, primarily a variety of **ducks**.



i Mahal.

These forests are around the Aravalli and the Vindhya ranges, each of which has distinctive geological features. The forest is of typically dry deciduous type with dhok being the most prominent tree. Ronj, ber, salai, occasional mango groves, palm trees, banyan and pipal trees give it a character all its own.

Photographer's dream: The entry point to the National Park from Sawai Madhopur town takes the visitor to the foot of the Ranthambore fort and the Jogi Mahal. India's second-largest banyan tree rules supreme here with its visiting langur troupe. Close by is **Padam Talao** (tank), which takes its name from the water lilies in it. At the far end is the **Raj Bagh Talao** followed by **Milak Talao**, which dries up in summer. These lakes attract considerable concentrations of ungulates, which in turn attract tigers. On several occasions they have been seen from the edge of the lake, hunting or resting in the water. Trips around these lakes are a wildlife photographer's dream.

From the lakes one can take fascinating trips to **Nal Ghati** and **Lahpur** through the enchanting **Dhok Avenue**, to **Bakaula** and **Anantpur** via **Lakarda**, or to **Kachida valley** and **Anantpura**. These are the most frequented routes visitors take and both morning and evening outings are rewarding as animals are active at that time. A jeep is a must as the forest roads make it rather tough going at places.

The park is studded with remnants of its historic past. Old defensive walls, wells, mosques and other structures bear mute testimony to kingdoms and battles long forgotten. Overgrown with pipal trees, they blend with their natural surroundings, thus lending to it an incomparable charm. **Raj Bagh**, a quadrangle with *baradaris* (sitting areas) between Padam Talao and Raj Bagh Talao, is a mixture of architectural styles with ruins of fountain systems and apartments. Tigers have often been seen roaming about freely in these ruins and some visitors have been lucky enough to be able to photograph them in these unlikely surroundings. The whole forest is dominated by the massive battlements of Ranthambore fort – worth a visit for its own sake, but doubly so within the sanctuary.

SARISKA TIGER RESERVE

In the Aravalli range which cuts across Rajasthan, a few pockets of forest still survive. Sariska is one such. It was part of the erstwhile princely state of Alwar whose late Maharaja, Jai Singh, was a keen shikari and his favorite hunting ground was Sariska, which received strict protection under his rule. In 1955 this forest was declared a sanctuary and it became a tiger reserve under Project Tiger in 1979. An area of 308 sq miles (800 sq km) is the project area with a core of 185 sq miles (480 sq km).

This region has always held **tigers**, and though the forest is much smaller now than it used to be, it remains a haven for them. At the last count in 1995, a population of 25 was reported, a substantial decrease on the 1985 figure of 35. Unlike in Ranthambore National Park, these tigers have not become diurnal. In fact, tiger sightings during daylight hours are uncommon but it appears that they are increasing as human interference decreases.

Panther, **jungle cat**, **jackal** and **hyena** are among the other carnivores of the forest. In 1985, three **caracal** were reported; to come across one on a drive would be a very rare event indeed. Sariska forest had not had any record of **wild dog** till three of them began to be sighted fairly regularly since the beginning of 1986, though it appears they are no longer in the park. The fact that wild dogs have not been reported from adjacent areas only deepens the mystery of their sudden arrival.

The **Siliserh Lake** is on the edge of the tiger reserve, just off the road between Sariska and Alwar. This road has considerable traffic and one is not likely to see many animals when driving on it though it runs through the sanctuary. But the lake itself has **crocodiles**, which can be seen basking on the banks, particularly in winter. There is also a small palace on a hill by the lake that is now a hotel.

Among the prey population are the **sambal**, **chital**, **nilgai**, **wild boar**, **hare** and numerous **porcupine**. Over the last 2 decades or more the prey population has become very visible and their numbers appear to be on the increase.

Wildlife observation here is best done by taking a jeep into the forest in the morning or evening. Sariska is the starting point. While there are many roads and tracks, the most

Sambar at water hole.

frequented is the surfaced road to **Kalighati**, **Salopka** and **Pandhupole**. One may expect to come across a variety of animals on these drives. Owing to perennial water shortage, the forest department has provided artificial water holes by the roadside that attract the animals.

Animal behavior at a water hole is fascinating to watch and this reserve offers unique opportunities for this. At Kalighati there is a hide at ground level and one at an elevation. There is another at Salopka. Apart from being comfortable, these hides have been carefully located so as to provide maximum sightings and photographic opportunities. Hides should be occupied by early afternoon, well before sunset, as a variety of animals come along to drink at that time. The concentration of ungulates is heavy, particularly in summer. If one is lucky, a tiger, a panther or a wild dog may put in an appearance, though the cats are likely to show up only after dark, and cautiously.

The park is rich in birdlife too. Common **pea fowl** abound, and **gray partridge**, **quail**, **sand grouse**, **tree pie**, **white-breasted kingfisher**, **golden-backed woodpecker**, **crested serpent eagle** and **great Indian horned owl** are among the many species found here. While sitting in the hides at Kalighati and Salopka, one can observe some of the birds at close quarters when they come to drink.

The forest is of a typical dry deciduous type with dhok, khair, tendu, ber, surwal and goria among the flora of the forest. It is lush and green in the monsoon months but in the summer months it is completely dry.

In the Sariska region there are many places of historical interest. The **Nilkanth temples** (6th–13th century), situated about 20 miles (32 km) from Sariska, are in ruins, though one of them, to Lord Shiva, is still used for worship. The **Kankwari fort** was used by Emperor Aurangzeb to confine his brother Dara Shikoh, whom he defeated and later killed to gain the throne of Hindustan.

The late Maharaja Jai Singhji of Alwar built a massive **palace complex** at Sariska in 1902 within a large area of forest. The complex includes the main palace, nobles' quarters, staff quarters, stables and garages, a "French" pavilion and a swimming pool, all of which are now in varying degrees of disrepair. The main palace is now a hotel.

The best time to visit this forest is from November to March. In April, May and June, it is easy to observe the animals as they must come to drink at the water holes, but these months are extremely hot.

handsome
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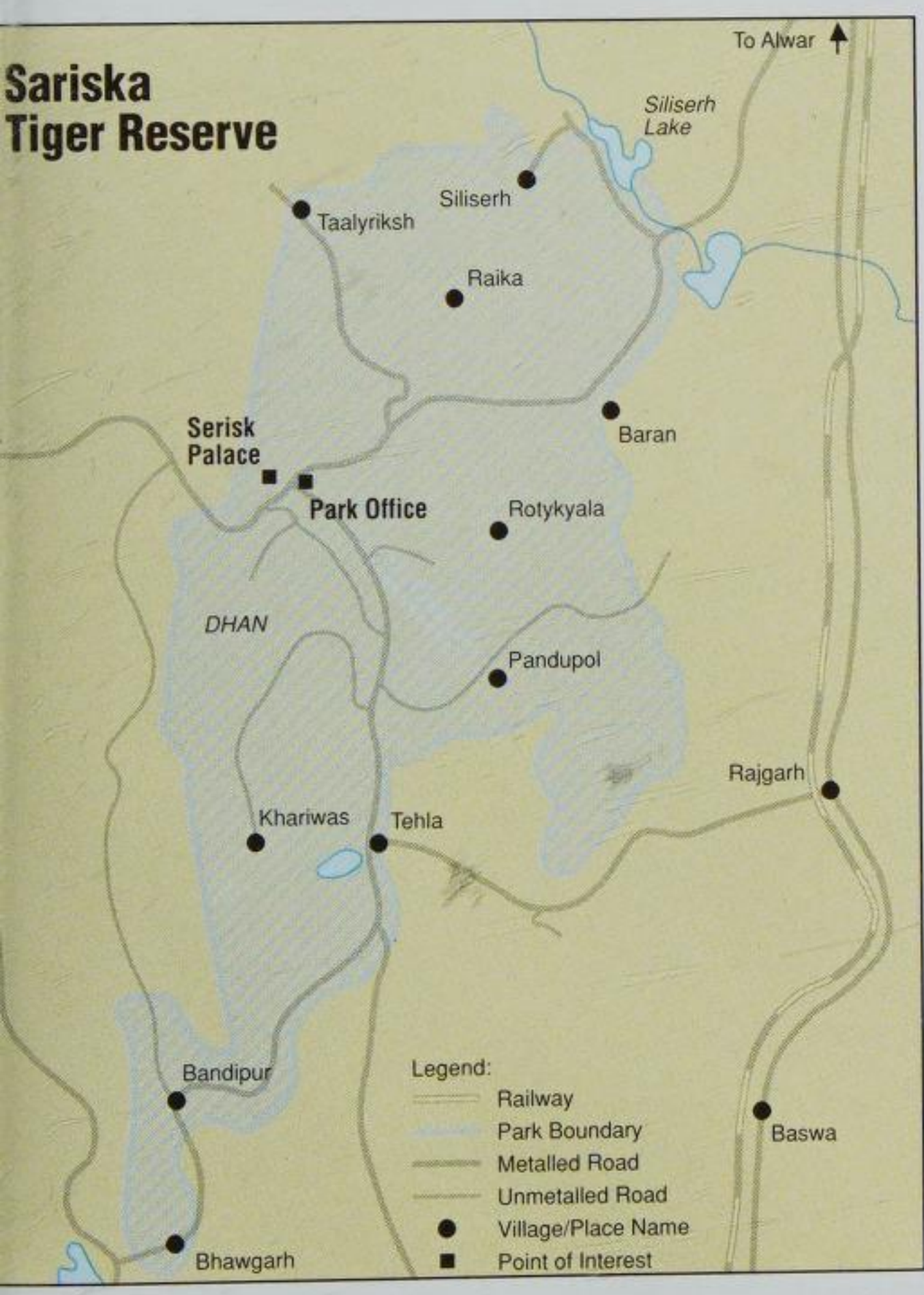


GIR NATIONAL PARK AND SANCTUARY

The lion has always occupied a unique position in India. More than 2,000 years ago Emperor Ashoka chose to inscribe some of his edicts on the famous lion capital of Sarnath, which is today the emblem of the Republic of India. This magnificent animal once roamed all over North India up to Bihar, but in the last one hundred years it has been wiped out elsewhere and today, the only surviving population of lions outside the continent of Africa is found in the Gir forest. Always considered royal game by rulers in India from time immemorial, lions were protected. But disappearance of their habitat has left them with only the Gir, their last habitat and their last refuge.

Home of the asiatic lion: In the south-west of the Saurashtra peninsula of Gujarat state, an area of 545 sq miles (1,412 sq km) of forest and grassland survives amid increasing pressure of human and cattle population. The forest area itself has shrunk by half since the turn of the 20th century and what remains is the Gir Sanctuary with a core area of 116 sq miles (300 sq km), which has been declared a National Park. It is no longer connected to even the Girnar Mountain where, until the mid-20th century, lions were often reported on the outskirts of Junagadh city. Sasan, with a lodge, is the headquarters of the sanctuary.

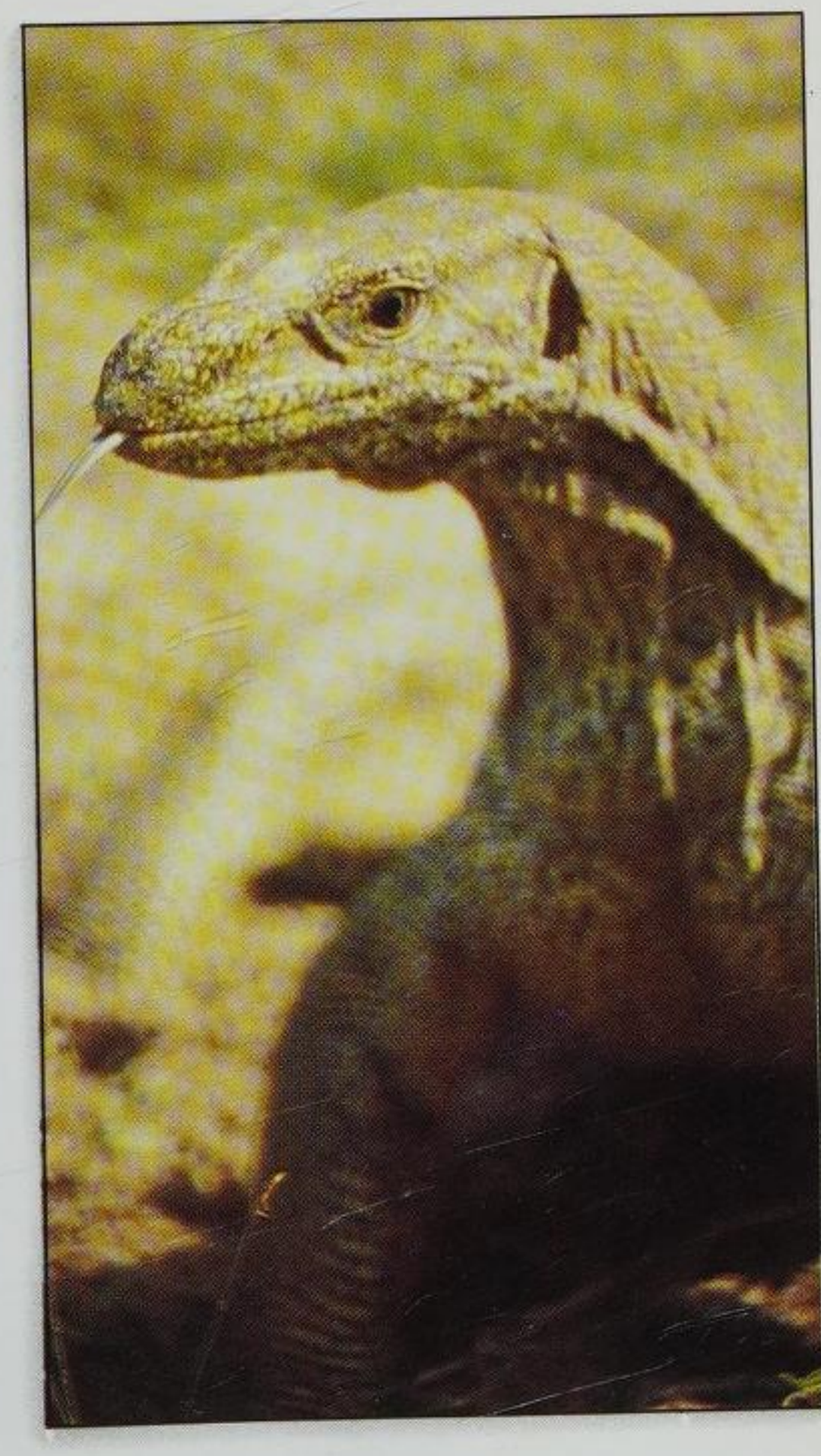
The Gir is a mixed deciduous type of forest with teak, ber, flame of the forest, jamun, a variety of acacia particularly babul and an occasional banyan tree. It is a hilly tract with many rivers and offers to the visitor long pleasant outings of quiet beauty.

At the turn of the 19th–20th century there was a disastrous famine, which lives in local memory as the "chappanio kal." The lion's prey population fell drastically and lions took to man-eating and their numbers declined drastically. It is believed that they were on the verge of extinction in 1913, with only about 20 animals left.

However, the Nawab of Junagadh, in whose domain most of the Gir forest fell, protected them vigorously and since independence in 1947 protection has continued, and lion hunting has been totally banned since the mid-1950s. As the Gir was only home of the Asiatic lion, there was an urgent need to establish their status. Consequently, the first systematic census of large mammals in India was conducted in the Gir in 1950 by the late M.A. Wynter-Blyth and the late R.S. Dharmakumarsinhji, both naturalists of outstanding ability. This set the trend for such censuses elsewhere in India, particularly those of tigers. By the mid-1990s, there are over 300 lions in the Gir forest as against 205 in 1979. These figures may well have declined due to the severe drought of 2000.

The best way to observe lion is, of course, in their natural surroundings at dawn and dusk, when these predators are on the move. This can be done from a jeep as, owing to the protection given to them, they are not shy of motor vehicles. Nevertheless, one cannot be certain about seeing them on all occasions and some visitors are disappointed. The Forest Department has set up a "safari park" in a fenced-off area of about 1,000 acres (400 hectares) of the forest where seeing the lions is more certain. The enclosure contains four to five lions that are easily viewed.

The **Asiatic lion** is slightly smaller than its African cousin and its mane is smaller too. Nonetheless, a large male lion of the Gir is indeed a sight to behold. A former Nawab, Sir Mahabat Khanji of Junagadh ordered a series of Gir lion postage stamps for his state way back in 1929, thus making the Asiatic lion the first wild animal to figure philatelically in India.



Preceding pages, lionesses at rest. Left, His majesty and right, monitor lizard.

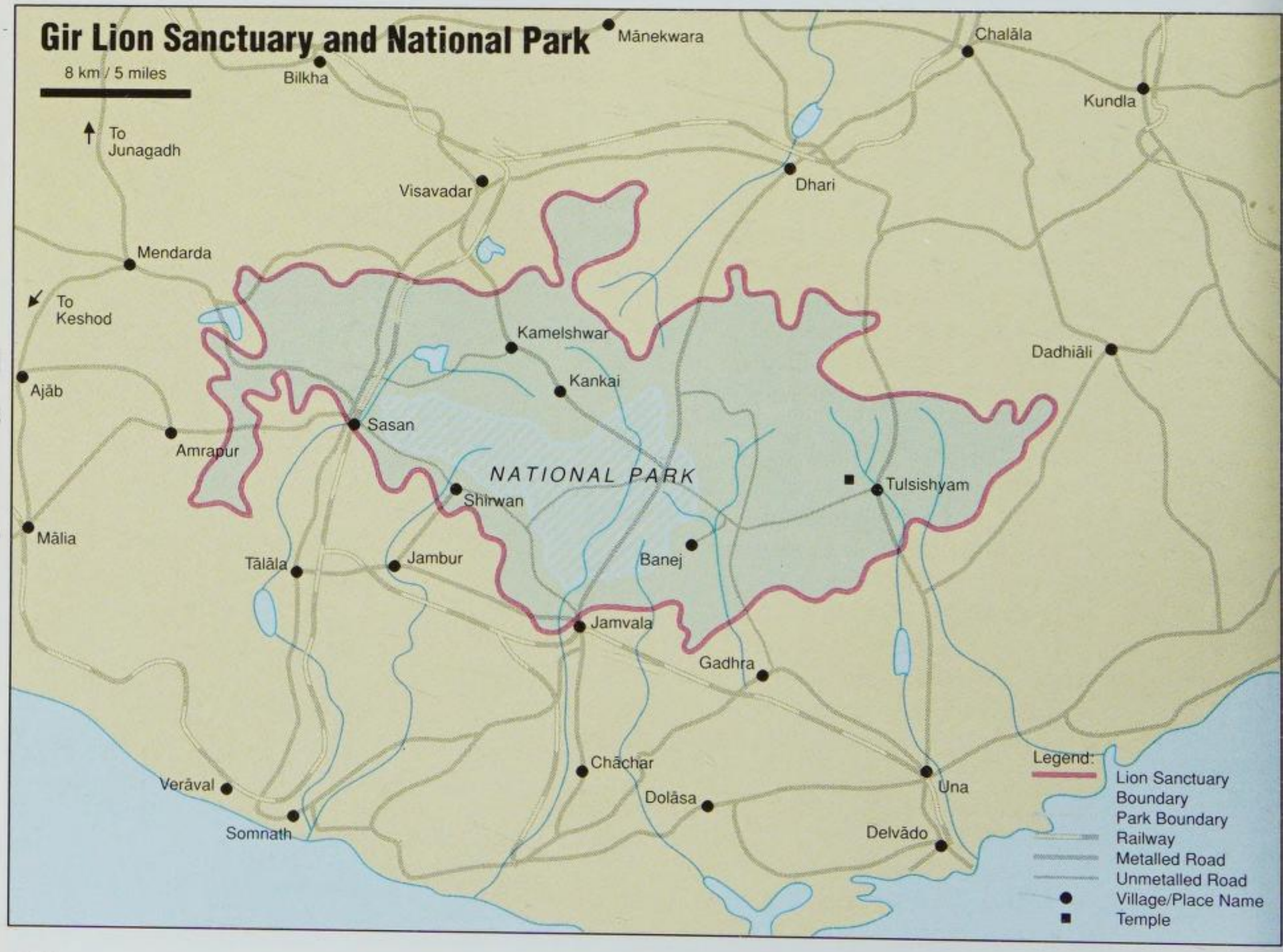
There have been two attempts in the past at translocating lions, both of which failed in the long run. The Gujarat State Government did propose to establish a second home for lions in the Barda hills near Porbandar. It has been proposed to set aside a 70-sq-mile (180-sq-km) area for the purpose. The success of this enterprise would depend on the availability of pre animals and sufficient area for the lion population to take root undisturbed. It was the obvious lack of these conditions which saw the end of the lions in this area some 80 years ago. Today the Barda hills area is no longer connected to the Gir as was the case then, and the scheme has not yet been realised even though it was proposed over 20 years ago. The Gir, therefore, remains the sole haven of the Asiatic lion, which, above all, is its unique attraction.

The **Hunters and the Hunted**: The Gir has always also had a large population of **panthers** and they are more visible here than in other Indian forests. In 1985 there were 201 panthers as against 161 in 1979. If one is lucky, they can be en-countered while driving through the forest.

According to the 1985 census, **sambar** number 772, **chita** 10,446, **nilgai** 2,081, **four-horned antelope** 1,063, **chinkara** (Indian gazelle) 311, **wild boar** 2,212 and **langur** 6,912. These are the prey population for the big cats, along with domestic cattle. Over the earlier census of 1979, chital, the most prolific breeders of the lot, increased by only 2,000 with a base population of approximately 8,000. The numbers of sambar, four-horned antelope and langur have been virtually stable, whereas nilgai, wild boar and chinkara have registered a marginal decline.

Among the other carnivores are the **wild cat**, the **jackal** and the **hyena**, the population of which increased to 192 in 1985 from 84 in 1979. The census was perhaps reasonably accurate as far as lions are concerned because of their noisy and gregarious habits but, for some of the other species, the accuracy of the figures is debatable and even if the figures were accurate back in 1985, the recent severe droughts will have undoubtably taken a toll on these populations.

The sloth bear is conspicuous by its absence from the Gir. Pythons and many species of snakes have been recorded. The Gir is an excellent area for seeing **marsh crocodiles** in its rivers but particularly in the lake of Kamaleshwar dam. There is a **crocodile breeding farm** at **Sasan**. It is from this farm that these reptiles are taken to restock the lakes and rivers of Gujarat.



The forest is remarkably rich in birdlife too. **Paradise flycatcher, black-headed cuckoo shrike, gray drongo, pied woodpecker, coppersmith, Indian roller, crested swift, fish owl, black vulture, shaheen falcon, Bonelli's eagle, crested serpent eagle, painted sandgrouse, rock bush quail, gray partridge, white-necked stork**, are among the many species of birds found here.

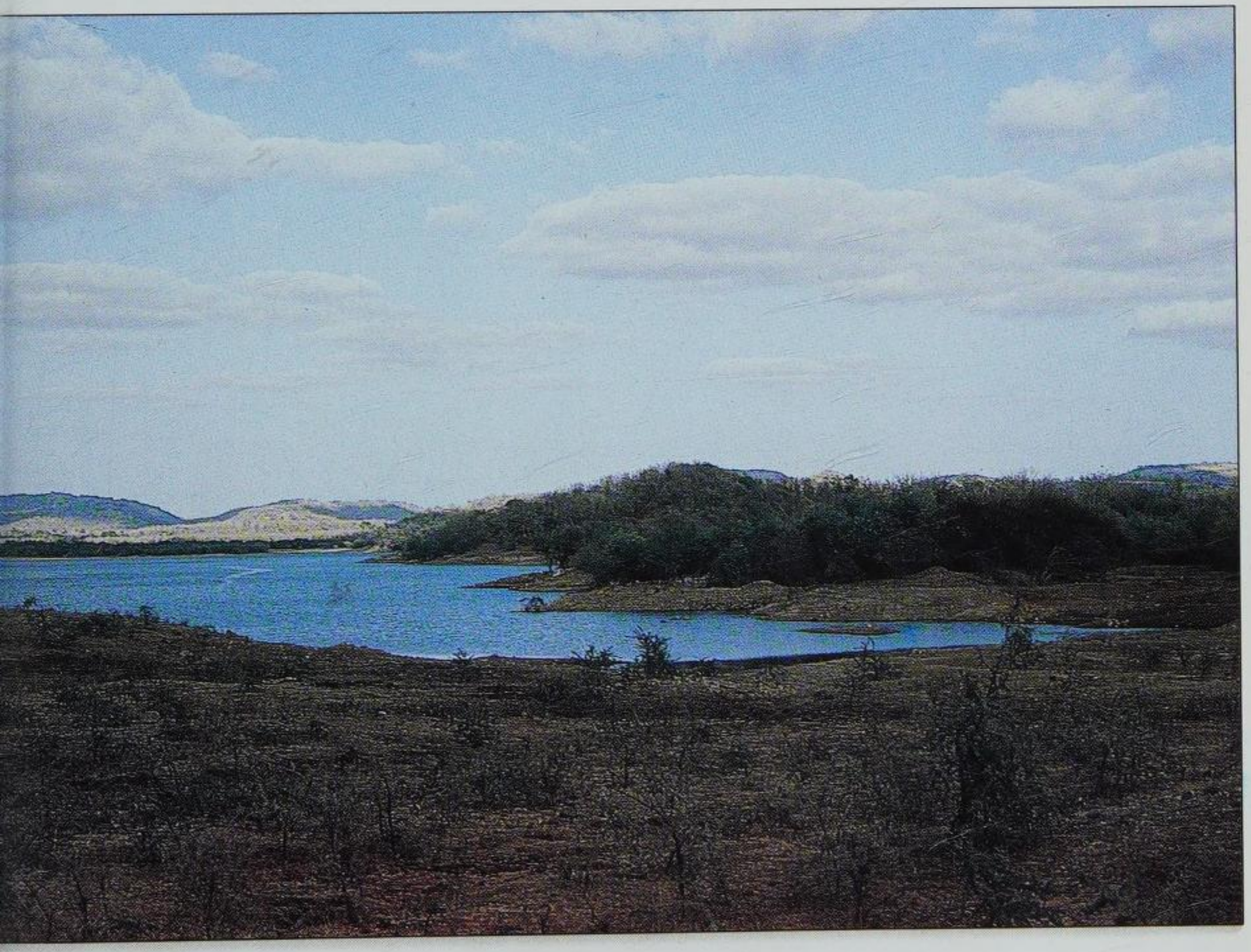
Wildlife viewing in the Girs is best done by driving around the forest. The best drives from Sasan are to **Baval Chowk** and **Kankai**, to **Chodavdi** and **Tulsishyam**, and to **Kamaleshwar dam**. The roads are manageable by a sturdy car, but a jeep is definitely advisable. The best time for viewing is at sunrise and sunset as the animals are most active at these times.

Lions and Humans: The Gir is steeped in history and folklore. It has temples of great antiquity like **Kankai Mata** and **Tulsishyam**, a place of pilgrimage with hot springs. The forest is famous for its cattle herders, the Maldharis, whose buffaloes form a substantial part of the lions' food. These herders live in small thorn-fenced settlements called *nes*, which are well worth visiting. The Maldharis' lives have changed little over the years and their folklore and traditions are a unique record of coexistence of human beings with lions.

A major problem of the sanctuary continues to be the human population and their cattle herds, despite certain steps being taken to meet this situation. For example, a rubble wall around the sanctuary prevents some herders and their cattle from entering the sanctuary, but sizable human and cattle populations remain within it. The cattle populations remain within it. The cattle population within the sanctuary is estimated at 20,000, and these compete for food and territory with the wild ungulates. Because of such disturbances, one does not in the Gir see sambar, chital, nilgai, etc. in such numbers and concentrations as one does in better-protected sanctuaries and national parks. Actually, cattle form a very substantial part of a lion's diet today, and, in seeming paradox, unless the Maldharis and their cattle are progressively removed, the Gir's natural prey population cannot increase; in fact it will continue to remain under constant threat of epidemics and a sudden drastic reduction in numbers.

The sanctuary usually remains closed from June to October and the best time to visit the forest is between December and March. The summer temperature can be as high as 104°F (40°C) while in winter it can be as low as 43°F (6°C).

landscape.

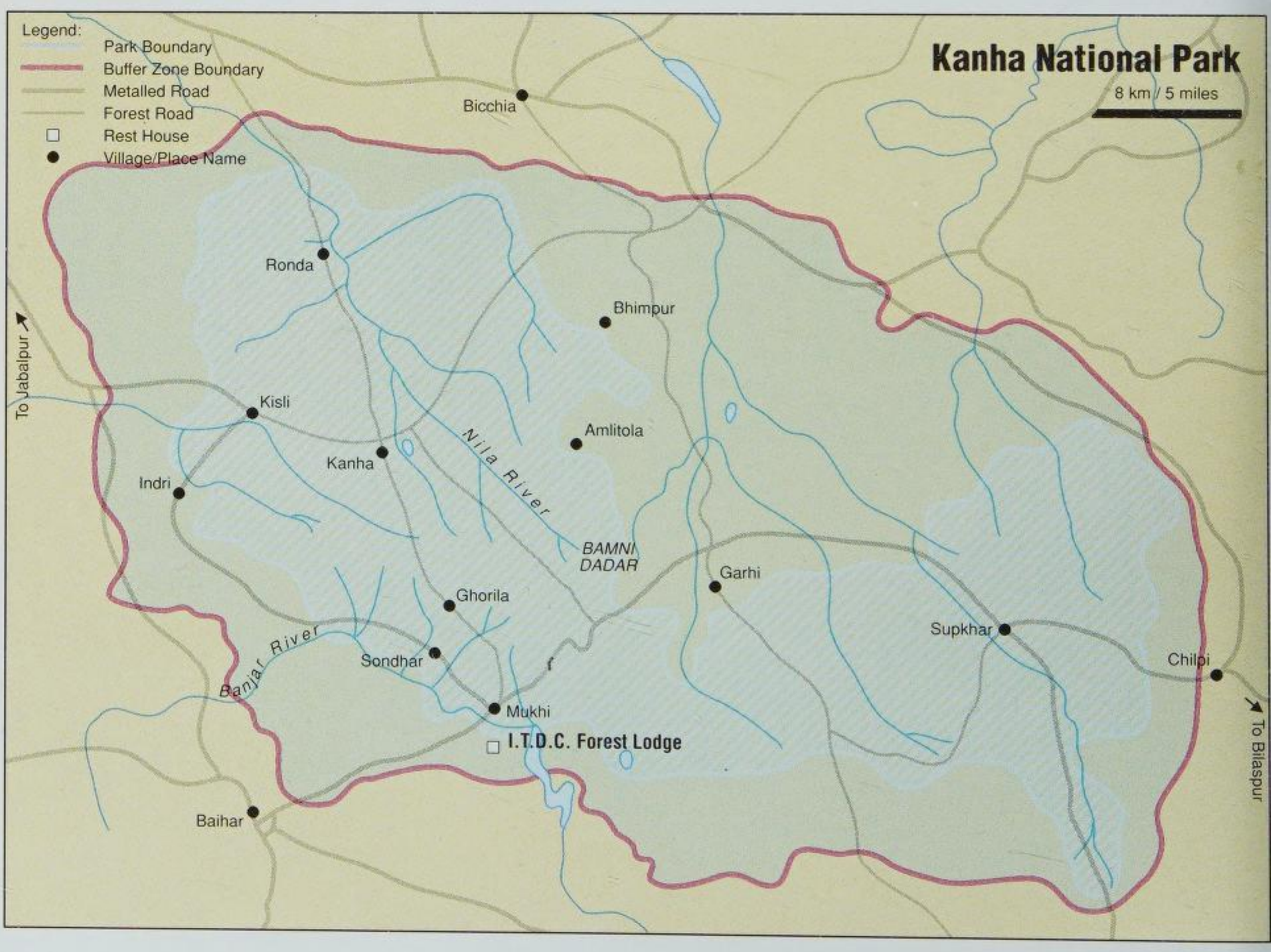


KANHA NATIONAL PARK

Kanha in Madhya Pradesh (five hours driving from Jabalpur, six from Nagpur) has sometimes been call the N'Gorongoro of India. The simile is apt, albeit Kanha is far greener and its cordon of hills far more densely wooded. Unlike Tanzania's N' Gorongoro, the Kanha valley is not a volcanic crater, though the enclosing hills are a consequence of geologically ancient volcanic activity. The horseshoe-shaped Kanha valley, which accounts for nearly a third and is the oldest part of the Kanha National Park, is bound by two distant spurs emanating from the main Mekal ridge, forming its southern rim. The spurs, in their gently tapering traverse, nearly close in the north leaving a narrow opening for the meandering Sulkum or Surpan river – the valleys main drainage. Herds of the Kanha miscellany, the axis deer (chital), the swamp deer (barasingha), the blackbuck (hiran), the wild pig and occasionally the gaur, throng the central parkland of the valley, providing the basis for the comparison with N'Gorongoro. With its confiding herds and relatively tolerant predators, Kanha offers an almost unrivaled scope to a keen photographer of Indian wildlife.

The forests of the Banjar valley and the Halon valley, respectively forming Kanha's western and eastern halves, had, even at the turn of the 20th century, been long famous for their deer and tiger. Expectedly, therefore, they were reserved as the exclusive hunting grounds for the most privileged, the British Viceroy, as early as 1910. The ups and downs in the ensuing decades gave an interesting conservation history to Kanha, which celebrated its golden jubilee in 1983. It all started with an area of some 96 sq miles (250 sq km) in the Kanha valley being gazetted as a sanctuary in 1933. This was followed by 116 sq miles (300 sq km) of the Haron valley around Supkhar also being declared a sanctuary in 1935. However, because of extensive deer damage to tree saplings in the forests and crops in nearby villages, the Supkhar sanctuary was denotified within a few years. Both these areas at that time still harbored teeming populations of the Central Indian **barasingha** *(Cervus duvauceli branderi)*. This majestic cousin of the nominate **swamp deer** *(Cervus duvauceli duvauceli)* of the sub-Himalayan floodplains had adapted itself to the hard-

Preceding pages, chital herd.

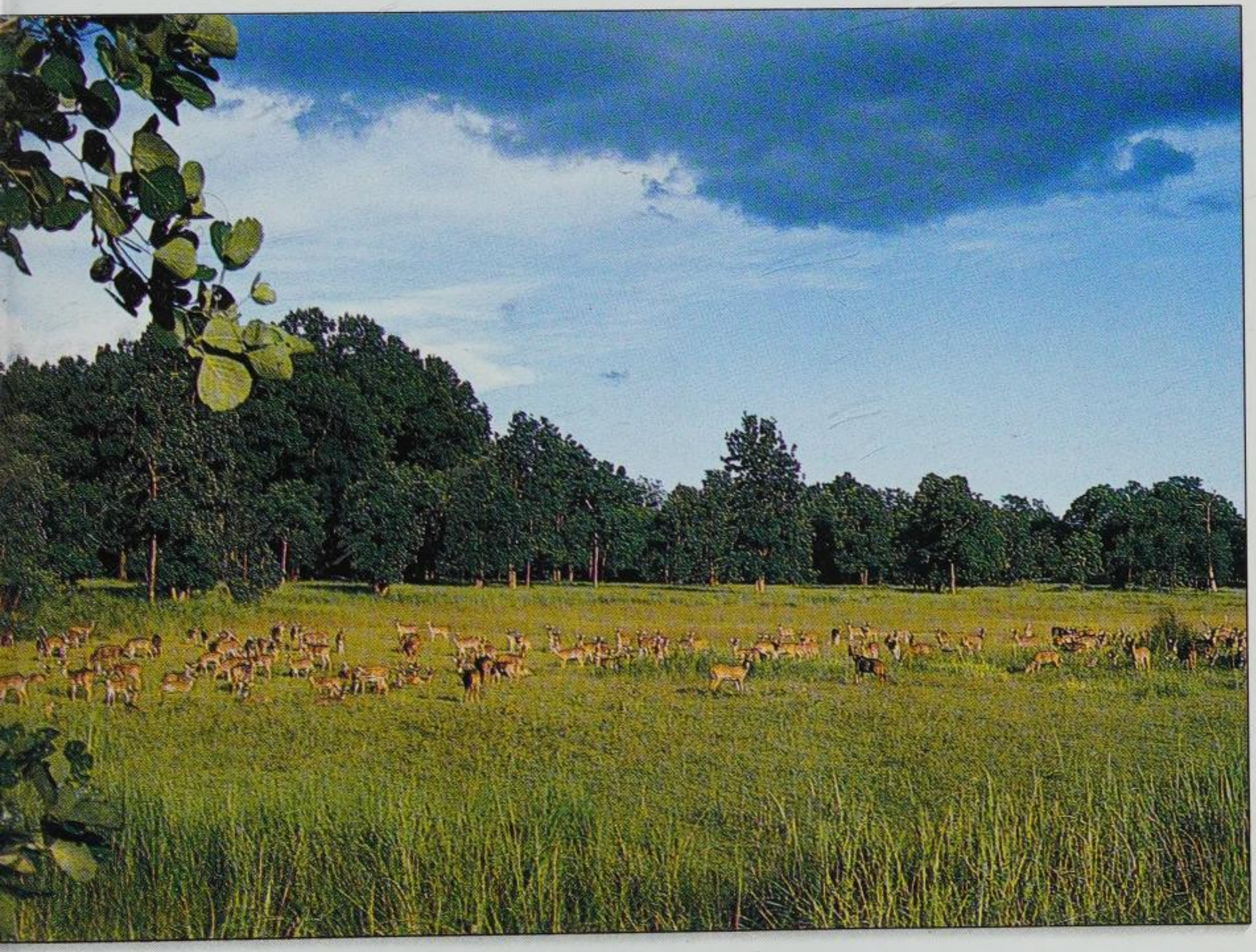


ground grasslands and until the turn of the 20th century dominated the Central Indian highlands.

Mounting pressures on the wilderness notwithstanding, Kanha valley survived as a sanctuary into the 1950s. Excessive stock-grazing had, however, jeopardized the barasingha's grassland habitat and its numbers had greatly declined. Yet a few thousand still found a home in Kanha valley's central *maidans* – meadows with sporadic groves of trees. Then in the early 1950s, in a scandalous act of butchery, a rich hunter was allowed to shoot 30 tigers in and around the sanctuary. The furore that followed led to special legislation and the Kanha valley was declared a 96-sq-mile (249-sq-km) national park in 1955. Since then, the gains have been steady. In 1962, the park was expanded to 123 sq miles (318 sq km). In 1970, the area south of the Mekal ridge and down to the river Banjar was added raising it to 172 sq miles (446 sq km). Finally, Project Tiger paved the way for the integration of the eastern Halon valley into the park system, initially on a sanctuary status in 1974 and as a full national park since 1976. This gives Kanha National Park its present area of 363 sq miles (940 sq km) which is further buffered by an additional area of 388 sq miles (1,005 sq km). The total conservation unit encompasses 750 sq miles (1,945 sq km) and is called Kanha Tiger Reserve under Project Tiger.

Rich habitat: Kanha's topography and geology combine variously to give it its rich habitat diversity. The range of elevation is 1,480–2,950 ft (450–900 meters) above mean sea level. The bauxite-capped hills sport extensive plateaus, locally called *dadar*, which carry extensive grasslands with only sparse tree growth. Folds at their fringes, where bauxite yields to basalt, have perennial springs. This combination is an ideal habitat for **gaur** *(Bos gauras)*, the largest of the world's cattle, **sambar** *(Cervus unicolor)*, the largest of the Indian deer, and **chousingha** *(Tetraceros quadricornis)*, the only four-horned antelope in the world. **Nilgai antelope** (**bluebull**) are common here and **sloth bear** are frequent visitors. You may see a **pied** or a **marsh harrier** *(Circus melanoleucus* or *C. aeruginosus)* hovering in the air and swooping on to a cluster of bush quail *(Perdicula asiatica)*. The rims of the plateaus have steep rocky slopes and often, escarpments. The latter prove a rare stance for breathtaking views of the valleys below and the hills beyond. Many of these plateaus are large enough for runways and indeed

ital herd at a pical Kanha eadow.



Bamhnidadar, 2,780 ft (850 meters) above sea level, on the southeastern rim of the Kanha valley had one operative until 1976. A late afternoon visit to Bamhnidadar to see some of these animals is greatly advised. Watching from here the changing hues of the verdant Banjar valley below, against the backdrop of a gradual, glorious sunset, is an enthralling experience indeed.

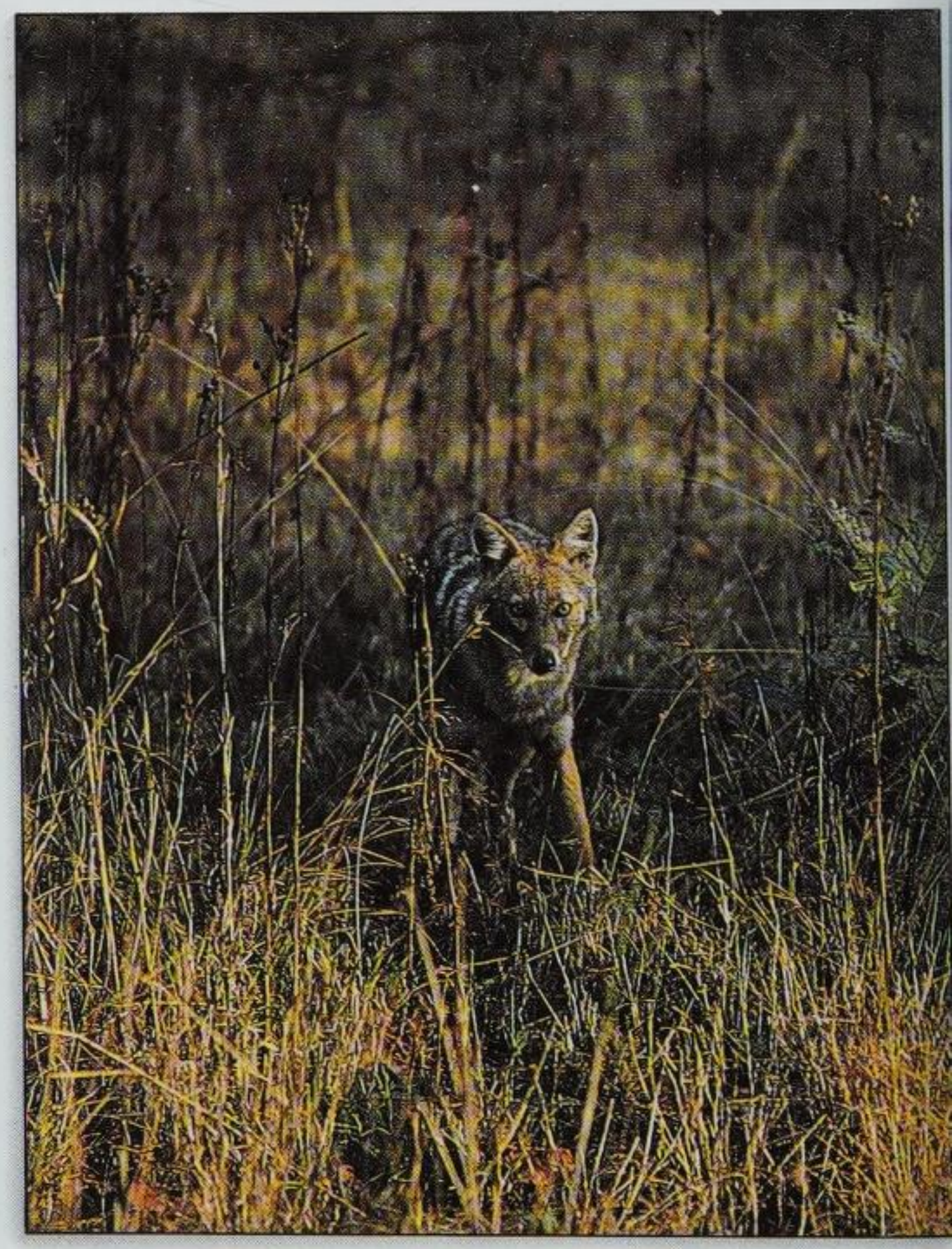
The trip down from these plateaus is through exquisite wild country. Huge trees of bija *(Pterocarpus marsupium)*, haldu *(Adina cardifolia)* and dhaora *(Anogeissus latifolia)*, along with a host of other large and small trees comprise the thick forests on the slopes. Garlands of massive mahul *(Bauhinia vahlaii)* climbers span the spaces between trees. Dense bamboo *(Dendrocalamus strictus)* thickets occupy the understory. Much of these mixed forests in such difficult terrain have escaped any form of exploitation and are a picture of raw wilderness. Sighting the **red jungle fowl**, the **painted spurfowl**, a shy **barking deer** *(Muntiacus muntjak)* pausing at the roadside glade and some gaur and sambar, is common. What may distinguish such a drive is a **leopard** hurtling down a tree or one simply walking along the road. Water is generally scarce on the slopes during the dry season. But in the upper reaches of the major *nullahs* where they flow through gorges carved in basaltic rock, the flow is perennial. There are also some seepage springs scattered amid the slopes. These water holes are the focal points for numerous animals and birds, large and small. In the lower slopes the forest cover changes, often abruptly, from mixed deciduous to lush green sal *(Shorea robusta)*, with or without bamboo.

The valleys with rich alluvium carry a mixed interspersion of stately, near pure stands of sal and extensive meadows. It is this characteristic parkland appearance of the valleys that typifies the Kanha landscape. The large grassy clearings are a consequence of old, abandoned cultivation, although many were formed as a result of a massive village relocation operation under Project Tiger. This important operation was undertaken with great success in order to meet the twin objective of preventing wild animal damage to the crops and cattle of the interior settlements in the park and to release wildlife habitat from human occupation and disturbance in this prime conservation area. Significantly, the operation was smooth and with full involvement of the affected, people who were provided adequate and viable alternatives in the form of agricultural land and newly organized housing at sites of their choice outside the park. This has been hailed as a major management success of the Kanha National Park in conservation circles the world over.

In recent years, however, concern has been raised about the degree of involvement in conservation of those peoples living on the park's fringes. The are mostly Adivasi groups who have traditionally relied on forest produce as a major source of income. Their important role as protectors of the forest buffer zone is compromised if they feel they have no stake in the running of the park, and the benefits that conservation can bring. This is perhaps the most pressing issue facing the park authorities, as motivated and informed local people can form one of the most effective barriers against poaching. While Kanha is one of the best protected and most successful national parks in India, poaching is not unknown and the pressures on the wildlife population, particularly tigers, can only increase in the face of huge demand for tiger parts from East Asia.

Kanha's jewel: The **swamp deer** or barasingha is the jewel of Kanha and its rescue from the brink of extinction, the crowning glory of its conservation achievements. The enlargement of grassland

Jackal.



habitat through village relocation has been the main basis of this breakthrough. Barasingha feed almost exclusively on grasses and tall grass meadows are essential to the security of their fawns from minor and major predators from August to September, when they are dropped, to late November. By this time, the fawns are strong enough to keep pace with the herds and are well initiated into the art of security through herding. Cultivation of the valley grasslands had appropriated the bulk of the grassland habitat while excessive stock grazing did not allow grasses to grow tall enough in the remainder. In consequence, the rate of success at raising young steadily declined and in Kanha valley itself the barasingha numbers fell from nearly 3,000 in the early 1950s to just 66 in 1970. This was the last surviving population of this sub-species in the world. Fortunately, as a result of measures taken, including village relocation, their population continues to show a steady increase and in 1986 had crossed the 500 mark which has been maintained.

With its multitined beams of antlers bent forward and adorned by crowns of grass tufts, the proud carriage of a dominant barasingha stag, silhouetted in profile through mist against sunbeams breaking through stately sal trees on an early winter morning, can be an all-quenching feast to the eyes of a nature lover. Peak winter, December–January, is the barasingha's rutting season and large congregations are seen in the Kanha and Sonph meadows. It is difficult to paint a picture in words of the impressive display of the big breeding stags, the rivalry among them leading to serious fights amid clouds of kicked-up dust, the almost unconcerned females grazing away, the youngsters looking askance, the chase by the victor, the run for life by the vanquished and the finale in the form of the majestic re-entry of the victor into the herd after a thorough wallow in mud. All this, while stag bellows echo from all directions.

Blackbuck is not an animal of the moist deciduous forests of the hills or the sal forests of the valleys. Yet the central Kanha meadows carry a small number of blackbuck. It entered Kanha valley from the plains outside, probably with the extension of cultivation along the Sulkum river. Now that the cultivation is gone and the overgrazed short grass meadows are changing over to taller grasses, the blackbuck is facing adversity. Its numbers, near 80 in 1972, had dropped to under 10 in 1986 and blackbuck are now rarely seen within the park. Jackals, normally scavengers but opportunistic

amp deer.

predators, have accentuated the jeopardy. When, following strict protection and intensive conservation measures in the 1970s, all wild animal populations showed a rapid increase, including the most populous chital, the jackal took to hunting the rich crop of chital fawns in the meadows by forming small packs. This opportunistic hunting was extended to blackbuck fawns in the central Kanha meadows from where, unlike chital, they had nowhere else to go. However, in a 69-acre (28-hectare) tiger-leopard-proof enclosure – raised originally for the barasingha – just south of Kanha, their number during the same period went up from about five to well over 30.

Shravantal is an ancient, small earthbound tank in the central Kanha meadows. This is an important watering source in the area. It even attracts a fair number of water fowl in winter – mainly the **lesser whitling teal**, but also to be seen are some **common teal**, **pintail**, **cotton teal** and an occasional **shoveler**.

Sighting animals: Kanha has a distinct monsoonal climate. Over 90 percent of its annual precipitation of 64 inches (160 cm) arrives between late June and late September. The park remains closed from July 1 to October 31, but an early downpour, washing away portions of fair weather roads, may enforce an earlier closure (though seldom before June 20). November is mildly cold while December and January are the coldest and given to severe frost, late night temperatures in valleys dipping to 29°F (-2°C). February and March is pleasant spring-like weather. April starts warming up while May and June is the hottest period. Premonsoon showers in late June kill the heat and herald massive deer congregations in the *maidans*, which quickly shed their brown-yellow and don the rich green of the new flush of grasses. This coincides with the second peak of the chital rutting season. Their rut starts in late March and stretches well into July, the first peak being from mid-April to mid-May. The valleys reverberate with the loud, sharp and long-drawn bugling of stags. The *maidans* are dotted with dominant stags displaying to and courting females and fighting rivals for them.

Jeep safaris in the park are permitted only by daylight. The best time is in early mornings and late afternoons.

Kanha animals are confiding and a little care in approach can yield prolonged pleasure observing interesting animal behavior within a species and interaction among different species. As soon as a group of animals is sighted the vehicle should slow down, and stop at a distance where the animals take note but do not run away. Soon they resettle, whereafter advances may be made gradually. With patience a vehicle can be positioned between groups of animals on both sides of the road. Vehicles are not allowed to leave the road. Nor is walking allowed while on excursions.

The best chances of seeing gaur are at **Bamhnidadar** in the late afternoons or in the early mornings in the **Bishanpura-Sondhar-Ghorella** area in the Mukki range. All these areas are good for sighting **wild dog** *(Cuon alpinus)*, or **dhole** (locally called **sonha kutta**) too. The dhole may also be often seen in Kanha and sonph *maidans*. Observing **langurs** – the species here is *Presbytis entellus* – is absorbing in itself, but their interaction with other herbivores is even more interesting. Langurs are often locally referred to as the chital's herders because seeing a herd of chital under a tree being foraged by langurs is a common sight. Chital and, sometimes, also **wild boar** *(Sus scrofa)* follow the foraging langurs and greedily feed on the leftovers of fruits and leaves generously thrown to the ground by the latter. The association is further advantageous to the deer and the boar because langurs, from their high stance on threes can see or detect a predator from suspicious movements much earlier than they can and raise the alarm in good time. Langurs are quite serious in such observations and seldom sound a false alarm.

Birds: Kanha's birdlife is rich, the tally of species being close to 300. Mornings are full of rich bird calls. **Peafowl**, sometimes dancing peacocks during March to June, are seen all over. The **Indian roller**, **racket-tailed drongo**, **red** and **yellow wattled lapwing**, **green bee-eater**, different **doves** (5 species), **gray hornbill**, **tree pie**, **myna**, **munia**, **bushchat**, **warbler**, **flycatcher**, **babbler and woodpecker** are commonly seen. **Blackheaded** and **golden oriole**, **paradise flycatcher**, **pied Malabar hornbill**, **Indian pitta**, **Indian stone curlew**, **common gray** and **painted partridge** and **green pigeon** are often seen on drives. **Black ibis**, **white-necked and lesser adjutant storks**, **white-breasted** and **pied kingfisher**, different **egrets** and occasionally **cormorants** are seen around water bodies or streams near Kanha, Sonph, Kisli and Mukki. The main birds of prey, often seen swooping down on and catching or feeding on small mammals, snakes and birds, are the **crested serpent eagle**, **crested honey buzzard**,

white-eyed buzzard, **blackwinged kite**, **shikra**, **lagger** and **shaheen falcon**, **kestrel** and a number of owls and owlets including the **barn owl**, **brown fish owl** and the **nightjar**. Often **whitebacked** and **scavenger vultures** and occasionally black and **longbilled vultures** can be seen scavenging on tiger, leopard and wild-dog kills. For bird-watchers staying at Mukki, the area along the Banjar river, and for those at Kisli, going round the Kisli and Kanha campuses, can prove highly rewarding. Penetrating into woodland on foot even around the campus is neither advisable nor permitted for reasons of safety.

Tiger land: The raw beauty of the Kanha wilderness is satisfying because a comparison of the condition of the forests outside with that of those inside is a strong pointer to "conservation in action" in the park. Kanha's diverse miscellany of mammal and birdlife is without many parallels, because so much is seen so well in so short a time. Yet Kanha is better known as a good place to see **tigers**, of which there were 97 recorded in 1995 (an increase on 1979 figures but sadly a decrease from the 100 recorded in 1993).

Sighting tigers on drives here is not uncommon, but seeing and photographing tigers depends very much on the skill and knowledge of your guide. The best time is very early in the morning for tiger tracking from Kisli, Kanha or Mukki.

As the dense sal forest makes sightings of tiger difficult, one of the most promising places for a sighting is a flattish *nullah* bed or a grassy glade amid stately sal trees. Pug marks, the drag of a kill, the various vocalizations of the predator, the crowing and shuttling of the crows, and the alarm calls of the langur and deer are signs that could lead to a rendezvous with the secretive tiger. The evaluation of these signs enables the guide to decide the right course. On a drive through the park, a good guide will suddenly stop and peer through the canopy of bamboo, ban-rahar *(Flamingia sop)* or sindur *(Mallotus philippinensis)* bushes lower down. He will adjust the jeep's position for a better view and point out what he has seen – the remains of a kill or the unmistakable stripes. Having made sure of a predator's presence in the area, he will avoid disturbing it.

While awaiting the tiger's arrival it is essential to remain quiet and still. Too much movement and noise might scare away the tiger. The strategy is to take advantage of the cat's urge to laze as the day advances. With the arrival of other jeeps, the game of out-flanking the tiger, hide and seek, begins and finally the tiger gets reconciled to being watched – a bit of a nuisance, but harmless. It is this relentless persuing of tigers that can ruin a day's wildlife watching – the jeeps running about the jungle scare off the more timid and equally interesting species that the park contians. A good course of action is often to pick a site with a good view and sit quietly and wait. Sometimes a tiger is sighted within two or three hours, and at others in less than an hour. On some days tigers are sighted at more than one area, on other days at none. Once a tiger settles down, it can be viewed for several hours.

But the game of tracking is thrilling and affords a real feel of the dynamic wilderness, something happening or expected to happen all the time. Many a time a **leopard** is seen, though unlike the tiger, not for a prolonged view. Other rare sightings may include a monitor lizard, or a **porcupine** or a **python**. Of course a host of birds and often gaur, sambar and muntjac are seen too.

Although elephant rides had been discontinued at Kanha, it seems they are now being used for tiger viewing again. When a tiger is sighted, the jeeps converge on the spot and the visitors are then transferred to elephants to approach the tiger.

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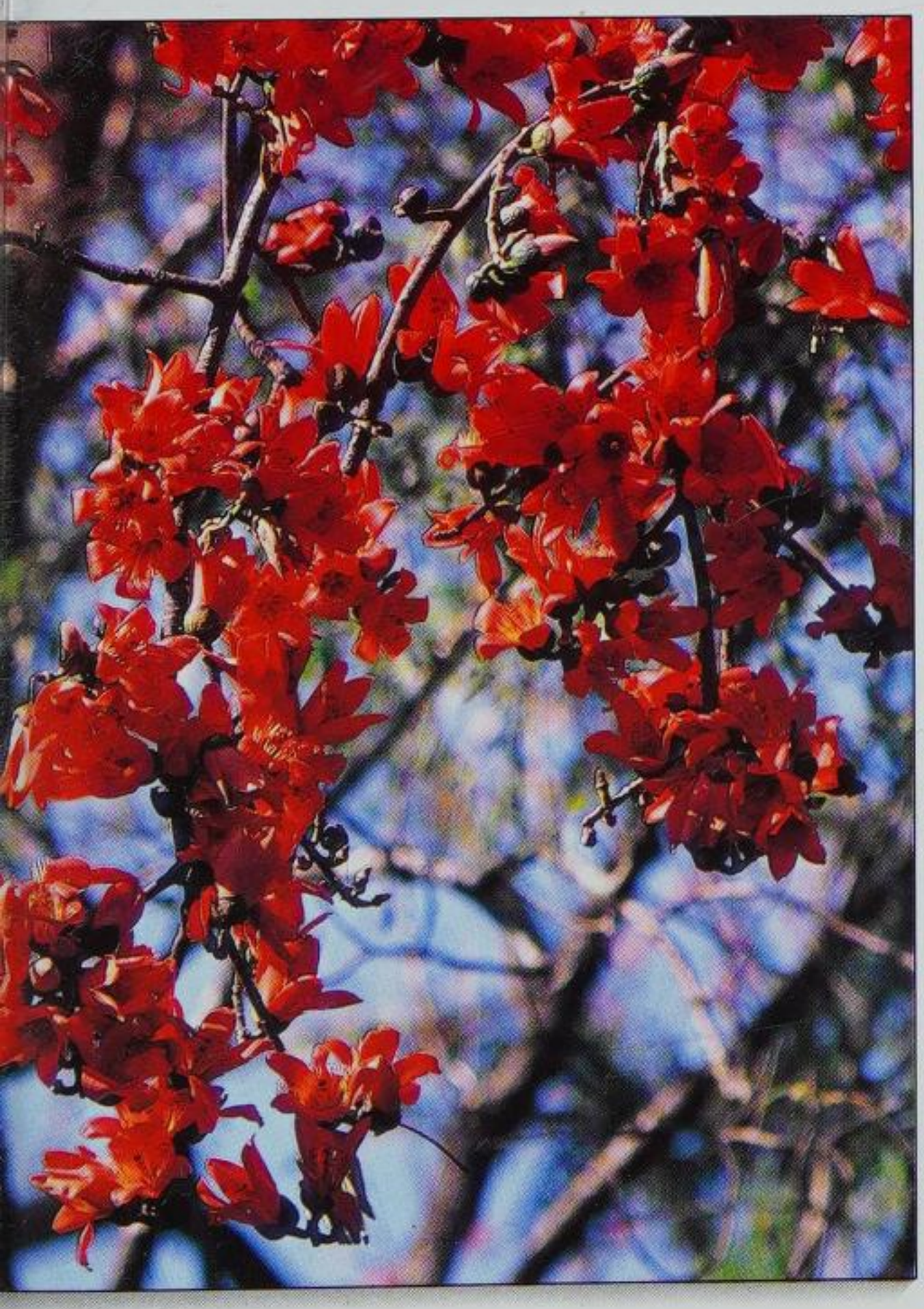


BANDHAVGARH NATIONAL PARK

Bandhavgarh is a new national park with a very long history. Set among the Vindhya hills of Madhya Pradesh with an area of 168 sq miles (437 sq km), it contains a wide variety of habitats and a high density of game, including a large number of tigers.

Geography, flora and climate: When originally formed in 1968, Bandhavgarh was a comparatively small park of only 40 sq miles (105 sq km), but in mid-1986 it was extended to include two large areas of forest adjoining it on the northern and southern sides. These extension areas consist mainly of sal forest. In the north a series of ridges, intercut by perennial streams, run parallel to the main Umaria road, which runs through the park. To the south, gently undulating forest is interspersed with grazing areas, formerly agricultural land.

Currently the central area of the park – the original 40 sq miles (105 sq km) – remains the principal viewing area. There are 32 hills in this part of the park, which has a large natural fort at its center. The fort's cliffs are 2,625 ft (800 meters) high, 1,000 ft (300 meters) above the surrounding countryside. Over half the area is covered by sal forest although on the upper slopes it is replaced by mixed forest sali, saj, dhobin and saja. Towards the north there are large stretches of bamboo and grassland. Most of the bamboo flowered in 1985 and the old clumps died, leaving the ground covered with new bamboo growth. Many streams run through the valleys but only three are perennial. One of them, the Charanganga, has its source at the fort.

Winter temperatures (November–mid-February) vary from almost freezing at night to around 68°F (20°C) in the daytime. Summer nights are also cooler than the daytime temperature, which rises to 104°F (40°C). The park is closed during the breeding season, which coincides with the monsoon (July–October). Rainfall in the park averages 50 inches (120 cm) per year.

History: Bandhavgarh has been a center of human activity and settlement for over 2,000 years. Legend has it that Rama, hero of the Hindu epic, the *Ramayana*, stopped at Bandhavgarh on his way back to his homeland after defeating the demon king Ravana of Lanka. Two monkey architects, who had engineered a bridge between the isle of Lanka and the mainland, are said to have built Bandhavgarh's fort. Later Rama handed it over to his brother Lakshmana who became known as *bandhavdhish*, "the lord of the fort – a title still used by the present "lord of the fort," the former Maharaja of Rewa. Lakshmana is the particular god of the fort and is regularly worshipped in a temple there.

The oldest signs of habitation in the park are the caves dug into the sandstone to the north of the fort. Several contain Brahmi inscriptions dating from the 1st century BC. From that time onwards Bandhavgarh was ruled by a succession of dynasties including the Chandela kings of Bundelkhand who built the famous temples at Khajuraho. The Baghel kings, the direct ancestors of the present royal family of Rewa, established their dynasty at Bandhavgarh in the 12th century. It remained their capital until 1617 when the center of court life moved to Rewa, 75 miles (120 km) to the north. Without royal patronage Bandhavgarh became more and more deserted until forest overran the area and it became a royal hunting reserve. This helped to preserve the forest and its wildlife, although the maharajas made full use of their rights. Each set out to kill the auspicious number of 109 tigers.

At independence Bandhavgarh remained the private property of the maharaja until he gave it to the state for the formation of a national park in 1968. After the park was created, poaching was brought under control and the number of animals rose dramatically. Small dams were built to solve the problem of water shortage. Grazing by local cattle was stopped and a village within the park boundaries was relocated. The tigers in particular prospered and the 1986 extension provided much-needed forest to accommodate them

Within the park: Bandhavgarh is justifiably famous for its tigers, but it has a wide range of other game. The undergrowth is not as dense as in some northern *terai* forests, but the best time to see the park's inhabitants is still the summer months when water becomes more scarce and the undergrowth dies back.

The most effective way to search for **tigers** is on elephant back. Government elephants belonging to the Forest Department can be boarded from a point near the **Forest Rest House**, not far from the park entrance. It's advisable to book your elephant in advance and to wear plenty of warm clothing if going for an early-morning ride in winter. The *mahouts* are kept well-informed of the whereabouts of the nearest tigers but will generally only go for comparatively short trips into the jungle on the north side of the

Small creatures are also facinating.

main viewing area. However, there are many tigers in the park and elephants are able to take you up steep, rocky hillsides and down marshy riverbeds that are impassable to vehicles.

There are several good-weather roads in the park. Jeeps are definitely recommended over other vehicles and can be hired from the **White Tiger Forest Lodge** or the **Bandhavgarh Jungle Lodge**. Other places to stay include the **Bandhavgarh Jungle Camp**, **Tiger Trails** and the **Patel Lodge**. It's also advisable to take a guide. Good, English-speaking guides, who are also available from the lodges and rest houses. A forest guard must accompany all visitors into the park. Entry into the park is allowed only during daylight hours. For both elephant and jeep rides the hours immediately after dawn and before sunset are best.

Chinkara, still rather shy, can be sighted on the grassland areas of the park, particularly on formerly cultivated land in the southern extension area, on the edges of the main viewing area. Also to be seen in the grasslands are **nilgai**, **chausingha** and sounders of **wild boar**, as well as the occasional **jackal** or **fox**. In March and April **gaur**, or Indian bison, move down from the higher hills to the southeast of the park and make their way through the southern extension area to the central meadows of the park to graze. The need for water and good grazing draws them to the park and the return to the southeastern hills at the onset of the monsoon.

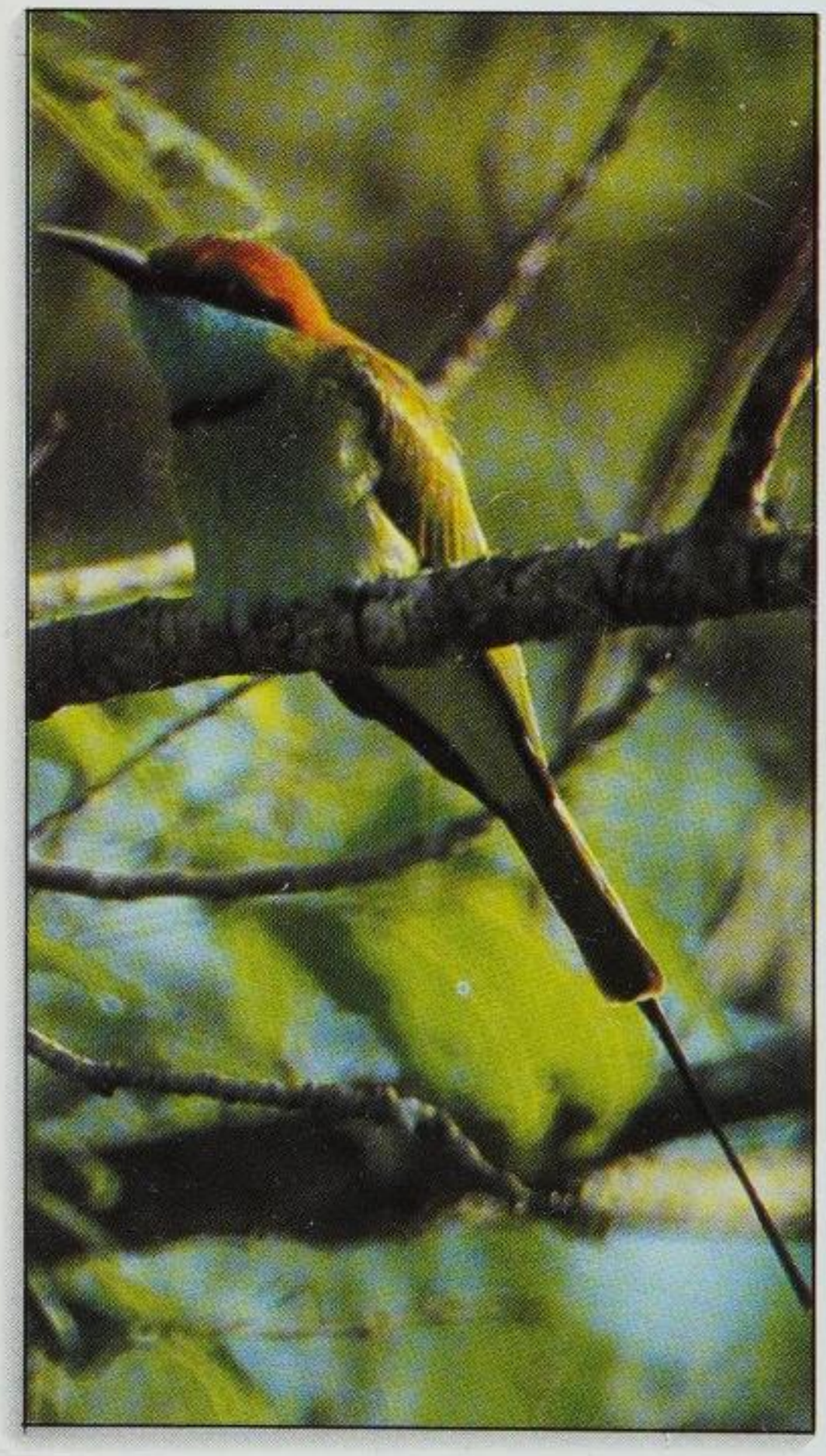
Muntijac and **sambar** prefer denser vegetation. The main prey animal, however, for the tigers and the park's rarely sighed leopards are the **chital**, which now number a few thousand.

There are two types of monkey common in the park – the **rhesus macaque** and the **black-faced langur**. Drives can also reveal **jungle cats**, **hyenas**, **porcupines**, **ratels** and a variety of other mammals. At least one small pack of wild dogs inhabits the central area of the park.

As the park is relatively new, there is still a good chance of adding birds to the checklist of some 150 species already compiled. Bandhavgarh attracts many migratory birds in the winter months, including birds of prey like the **steppe eagle** and a variety of wildfowl. However, as it has limited water surfaces it cannot compete with parks with large areas of wetland. While you aren't allowed to go into the park on foot, the park headquarters and the Jungle Lodge and Camp offer excellent opportunities to watch the smaller birds. Attracted by flowering and fruiting trees, some very attractive and less common birds can be seen – for example the **blue-bearded bee eater**, the **white-bellied drongo**, **Tickell's blue flycatcher**, the **white-browed fantail**, both the **gold-fronted** and **Jerdon's leafbirds**, **minivets** and **woodshrikes**. Any large fruiting tree generally reveals a population of **green pigeons** and some of the noisiest residents – **blossom-headed parakeets**. **Gray** and less often, the magnificent black and white **Malabar hornbills**, fly across. On roads through the sal forests it's worth looking out for the large **racket-tailed drongo** and the dipping plumes of the **paradise fly-catcher**.

The Fort: The fort still belongs to the Maharaja of Rewa and permission is required to visit it. However, permission is available locally and no trip to Bandhavgarh can really be complete without making the effort to climb up to the fort.

There are two ways up on to the plateau, a jeep track and a footpath – both steep. It is far easier to see the fort by jeep but much more rewarding to make the journey on foot. There is a convenient place to park vehicles on the southern side of the fort in the lush jungle that surrounds its base. This point is known as **Shesh Saya** , named after a unique 35-foot (11-meter) long statue of a reclining



Green bee-eater.

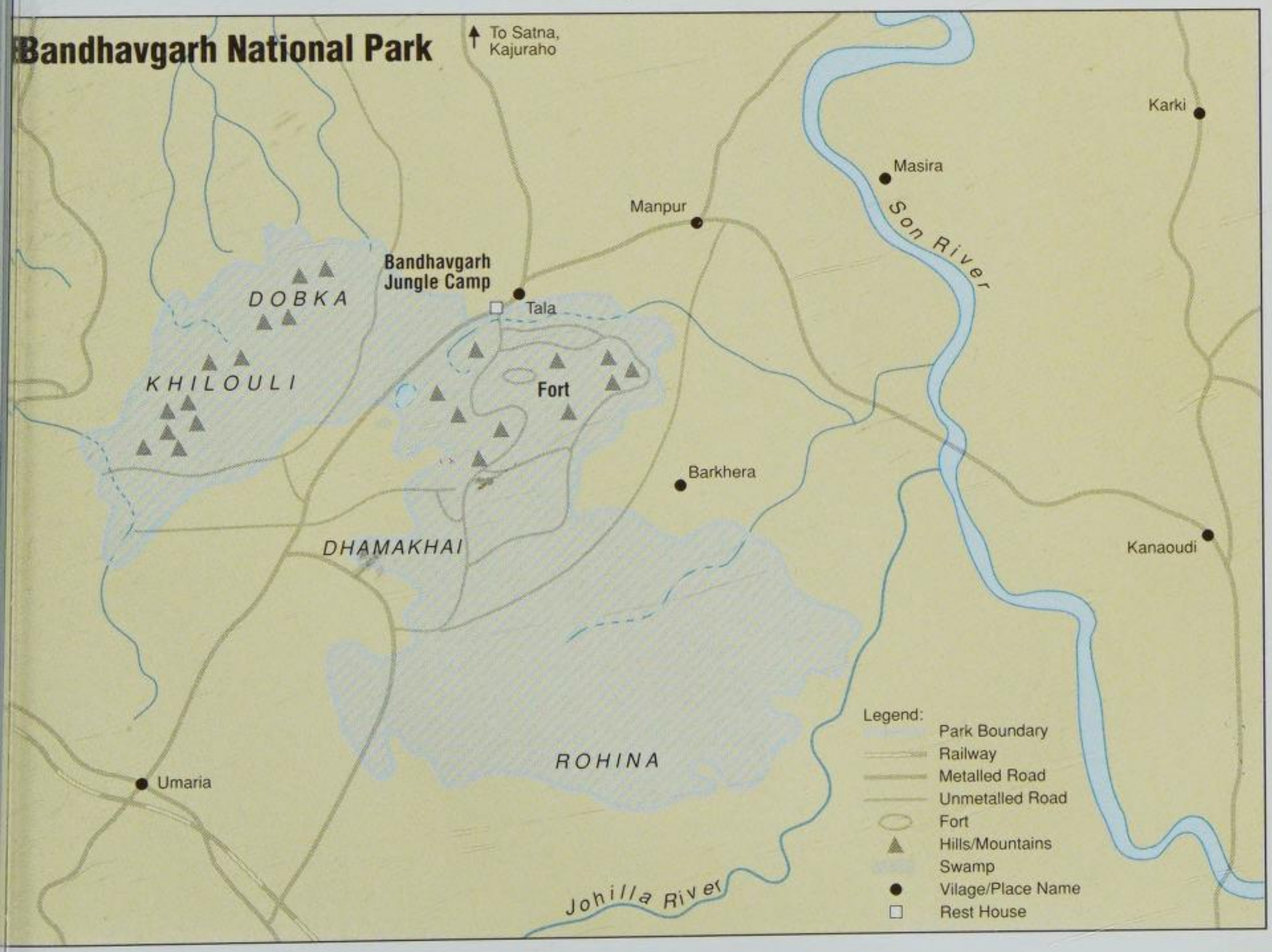
Vishnu carved around the 10th century, from whose feet the Charanganga is said to flow.

A rectangular pool of sprintwater lies just beneath the statue and the path to the main gate of the fort, the **Kart Pol**, leads off to the left of the pool. On the other side of this imposing gateway lie 560 acres (227 hectares) of grassland, over which are scattered turtle-filled tanks and the many remains of the human inhabitants of the fort – from ancient statues to the barracks occupied by Rewa's troops up to independence. At a brisk pace the walk from the Shesh Saya to the southern side of the fort need only take an hour, but if you stop to see the statues and temples on the way it can easily take much longer.

As you follow the path southwards, the most remarkable sights are the 10th-century rock images of the incarnations of Vishnu. A statue of Narasimha (half-man half-lion) towers almost 22 ft (7 meters) above the grass. There is a carving of Barah Bhagwan (the boar incarnation), and a small temple enshrining a large image of Vishnu in his fish *avatar*. The tortoise incarnation stands unenclosed and flanked by later carvings of Ganesh, the elephant god, and other deities. The charm of this walk lies in discovering these monuments in the jungle, unspoilt and unexploited. Some of the statues lie off the main path and so it is best to take a guide. Apart from the *avatars*, well worth seeing are three small temples of around the 12th century. These temples are deserted but the fort is still used as a place of worship. Kabir Das, the celebrated 16th-century saint, once lived and preached here.

The natural ramparts of the fort give breathtaking views of the surrounding countryside. **Vultures** wheel around the precipice, which also attracts **blue rock thrushes** and **crag martins**. The fort has a small population of **blackbuck**, which have been reintroduced and to some extent protected from tigers in the park below by repairs to the masonry walls at the edges of the fort.

Thus Bandhavgarh offers excellent game and bird viewing and a historical interest that most other parks lack. It is a comfortable drive from Khajuraho and so visitors can enjoy both the spectacular 10th-century temples of the one and the wildlife of the other in one trip. And for those who enjoy train travel Bandhavgarh has two railway stations within reach – **Umaria** and **Satna** – and jeeps that can collect visitors from the station and deposit them on elephant back before breakfast.



NAGARAHOLE AND BANDIPUR NATIONAL PARKS

Tall trees, swaying bamboos and grassy expanses. Calls of mynas and drongos that pierce the gentle murmur of forest streams. A herd of gaur in the morning sun, with massive horned heads and pale green eyes that stare back at you. A blazing afternoon. A pack of wild dogs cornering a chital stag in a forest pool. An elephant herd frolicking in water as the setting sun bathes it in gold. As night falls, the haunting cry of a peacock retiring to the top of a tall, leafless tree. A sambar calling in alarm. A tiger is on the move, leaving its tracks on a dusty trail. This is typical South Indian jungle. Most of it is gone forever. Yet in the vast forests of the Mysore plateau in Karnataka state that stretch between the towering Western Ghats and Nilgiri mountains, the experience comes alive even now.

Administered separately, Nagarahole (pronounced *Naagara-holay*) and Bandipur are but two faces of a single spectacular ecological continuum that also includes Mudumalai and Wynad wildlife sanctuaries in the neighboring states. The 33-sq-mile (865-sq-km) **Bandipur National Park** lies south of the Kabini river which meanders through the jungle, while **Nagarahole** (247 sq mile/640 sq km, including proposed expansion) is to its north. The old royal capital city of Mysore is the gateway to both parks.

Due to their geographic proximity the two parks share many features. The balmy climate is common to both. So are most of the plant and animal species. Yet, there are differences too.

The Bandipur that the tourist sees is an open, grassy woodland. The jungles of Nagarahole are taller and denser. Bandipur has superb scenery of mountains, gorges and undisturbed forests. Nagarahole has an astonishing abundance of wildlife. Together, these two parks cover more than 580 sq miles (1,500 sq km). About a third of this area has been demarcated as the "Wilderness Zone" in which all disturbances, including tourism and forestry, are prohibited. The facilities for wildlife tourism have been developed in the three "tourism zones." Two of these, called **Nagarahole** and **Karapura** are in Nagarahole National Park while the third is in Bandipur. Two more tourism zones, at Begur in Bandipur and Moorkal in Nagarahole are being planned.

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These parks have had some of the most troubled recent histories of any of the Indian parks. They are periodically closed to visitors due to the activities of sandalwood smugglers and poachers – most notably the infamous Veerappan and his gang (their recent kidnapping of the Kannada actor Rajkumar is likely to put the parks out of action for some time). Visitors are strongly advised to check with the parks' authorities what the current state of access is. A further problem has been forest fires. These occur both because the dry grasslands of the parks are naturally prone to fire, and because of arson – which provides a cover for poaching and expoitation of the forest for firewood and other resources. The park authorities are very overstretched and unless there is a concerted effort to stamp out poaching and encroachment on to forest land the intolerable pressures the parks' face may prove fatal for these precious environments.

Climate and landscape: Three seasons are usually recognized. The wet season or monsoon lasts from June to September. The cool season that follows lasts up to January. The hot season or summer extends from February to May. However, seasonal variations of temperature are quite moderate, ranging between 59°F (15°C) at the coldest to about 82°F (28°C) at the hottest. Annual rainfall is lowest at the eastern edge of Bandipur – 32 inches (80 cm). It increases gradually as you proceed in a northwesterly direction, reaching about 60 inches (150 cm) at the western edge of Nagarahole. The landscape is generally one of gentle slopes and shallow valleys at an average altitude of 2,300 ft (700 meters). A few peaks are higher, Gopalaswamy Betta (4,770 ft/1,454 meters) in Bandipur Park being the highest.

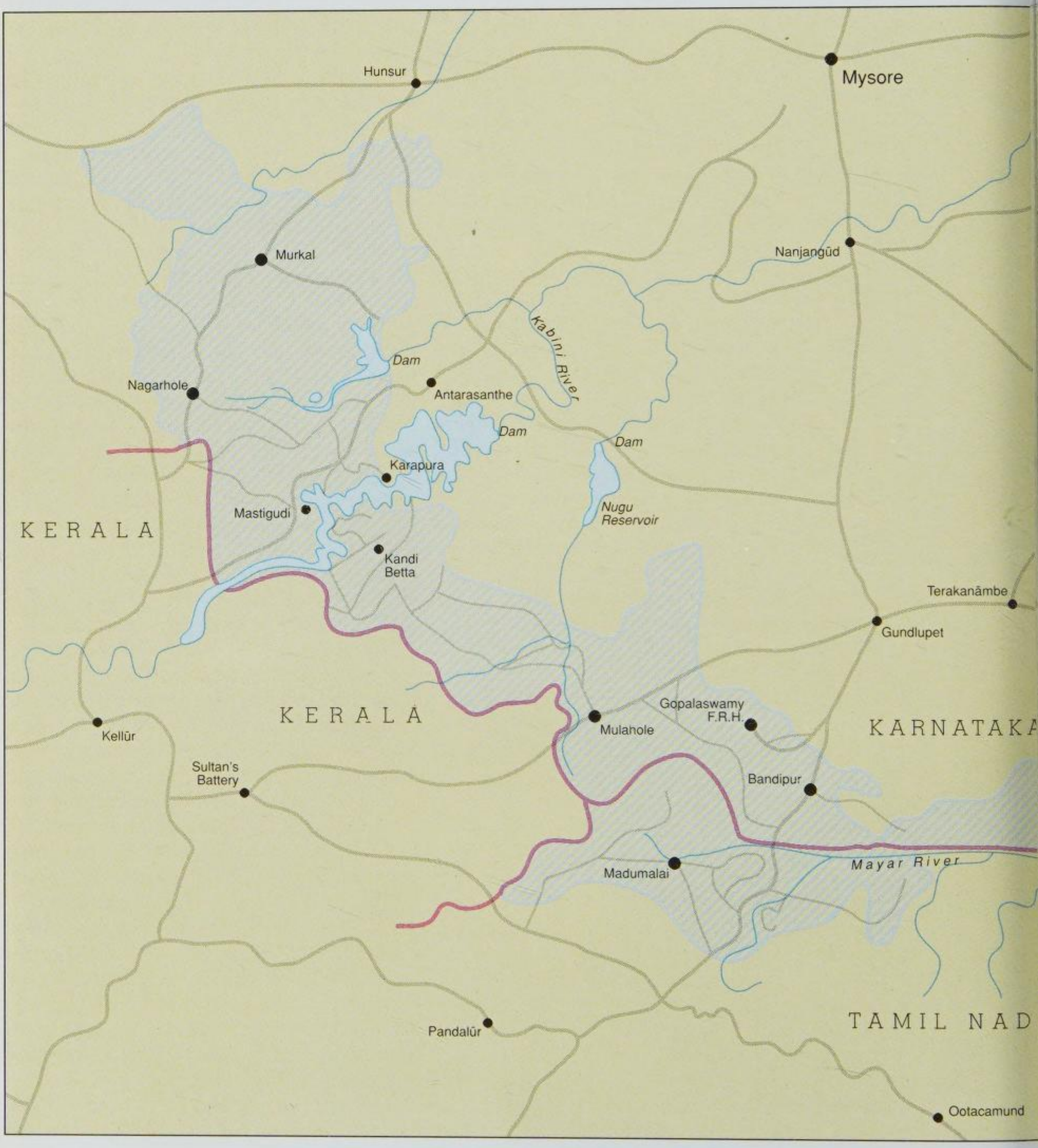
Kabini, a tributary of the mighty Cauvery, is the largest river draining this tract. Other important rivers are the Moyar and Mulehole (both in Bandipur), the Lakshmana Teertha and Nagarahole – the last name meaning "Cobra River." An irrigation dam was built across the Kabini in 1974, creating the picturesque lake that separates the two parks.

Two basic types of tropical, mixed deciduous forests clothe the region. The moist deciduous type, usually occurring in localities getting a rainfall higher than 48 inches (120 cm), is found in the northern and western parts of Nagarahole Park as well as on the western fringes of Bandipur. The dry deciduous type covers the southeastern part of Nagarahole and most of Bandipur. Interestingly, unlike the temperate-zone forests, these tropical deciduous forests are leafless in summer rather than in winter. The period

of leaf fall, essentially in ecological adaptation to cope with water stress, is relatively shorter in the moist type when compared to the dry.

The most deciduous forests are tall and dense. The tree canopy is usually two-storied. (The upper canopy, about 98 ft (30 meters) tall, is dominated by valuable timber trees such as mathi *(Terminalia tomentosa)*, nandi *(Lagerstroemia lanceolata)*, honne *(Pterocarpus marsupium)* and tadasalu (Grewia tilaefolia). These jungles are reputed as the home of the two most expensive timbers – dark, shiny rosewood *(Dalbergia latifolia)* and the rich, grainy teak *(Tectona grandis)*. The lower forest canopy has the prolific fruit yielders – nelli *(Phyllanthus emblica)*, kooli *(Gonclina arborea)*, kadu tega *(Dillenia pentagyna)* and the *Randia S* – all of which attract a host of animals and birds. Bende *(Kydia calycina)*, whose bark is a great favorite with elephants, is ubiquitous.

Lower down, the shrub layer is usually very dense and varied in composition. However, in recent decades runaway exotic shrubs like *lantana* and *lupatorium* have established dominance, aggressively invading openings created by logging. In the moist deciduous forests grass growth is not very profuse



where the trees and shrubs are dense. But in cleared openings a variety of grasses grow.

A unique feature of these moist deciduous forests particularly in Nagarahole, are the open grassy swamps locally called *hadlus*. Here the soil is clayey, perennially moist, and supports a luxuriant growth of green grass all the year round. These are ideal spots to watch large concentrations of ungulates, particularly gaur.

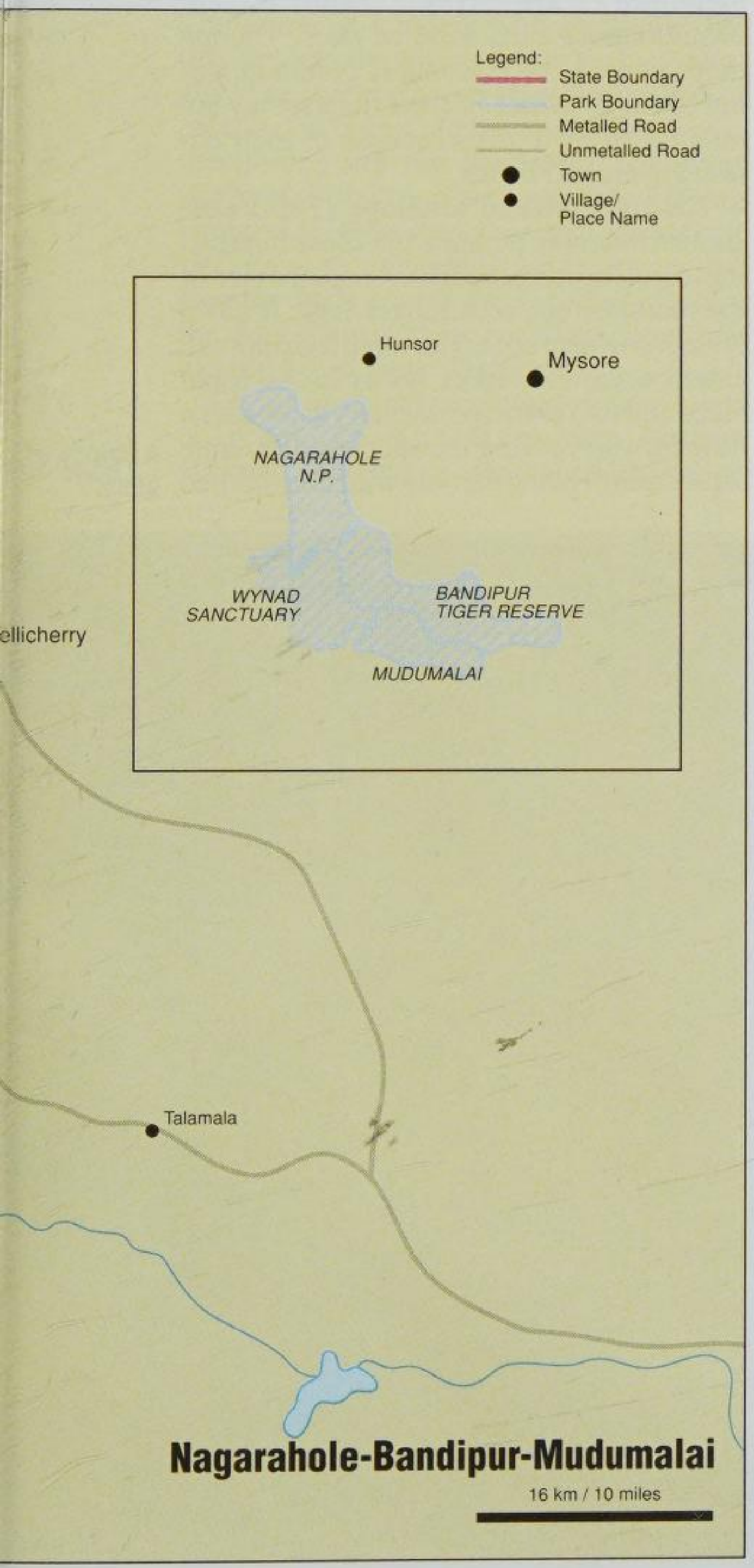
The dry deciduous forest type is strikingly different. The canopy is lower, trees are more widely spaced and their trunks are usually stunted and crooked. Many species of the moist type are present but their relative dominance varies. Dindalu *(Anogeissus latifolia)* is usually the commonest tree. Kakke *(Cassia fistula)*, "Flame of the Forest" *(Butea monosperma)* and bamboo *(Dendrocalamus strictus)* are all commoners. The second canopy is barely discernible. There are open grassland patches and the entire habitat has a woodland savannah-like appearance. In summer forage and water scarcity pose serious problems to the herbivores.

An even more harsh environment is found around the Moyar Gorge at the easternmost edge of Bandipur. In this region of lowest rainfall, dry deciduous forest gives way to an even poorer, stunted scrub type. The soil is rocky and barren and the vegetation dominated by thorny plants.

Elephants and others: The Nagarahole-Bandipur forests are perhaps one of the best remaining habitats of the **Asian elephant** *(Elephas maximus)* in the world. Over a thousand of these mighty beasts are estimated to range over this tract. A striking ecological feature of these elephant populations is their seasonal migration. In the wet season when water and forage are plentiful everywhere, the elephants are evenly distributed. This is the best time to see huge herds of them in the open forests of Bandipur. As the cool season ends and summer sets in, water and forage availability becomes restricted. Elephants congregate around specific localities like the banks of Mulehole river, Nagarahole Tourism Zone, and, above all, the banks of the Kabini.

Setting out on a jeep ride from Karapura you can reach a place called **Mastigudi** on the banks of the Kabini around sunset to witness a scene reminiscent of Africa rather than Asia. A breathtaking panoramic sweep of a mile-long stretch of the river is dotted with elephants – over a hundred of them. If you are lucky you might even see a herd swimming across, the adults carefully chaperoning the "little" babies. During the 19th century, G.P. Sanderson developed the *Khedda* (stockade) method of capturing elephants at this site. Though the medieval barbarity of the *khedda* is mercifully a thing of the past in this conservation-conscious age, we get a glimpse of it when the waters of the Kabini recede and the remnants of the old stockade are revealed.

Gaur *(Bos gaurus)*, largest of the wild bovids, are another attraction in these parks. Though they are still recovering from a population crash caused by rinderpest disease in 1968, gaur are a common sight at Nagarahole and Karapura, though not in Bandipur yet. Herds of 20–30 animals, or,



sometimes, massive solitary bulls, can be seen placidly grazing as you pass by in a jeep.

Four species of deer inhabit these forests. The largest of them is the **sambar** *(Cervus unicolor)*, a shy creature preferring thick cover and becoming active late in the evening. One usually tends to underestimate their abundance in any area. The usual sighting is of two or three animals, normally a mother with her young. During the wet season, occasionally, large temporary associations of 10–20 sambar are seen. Very large stags with fine antlers are also seen in Bandipur.

The commonest deer in both parks is the **chital** or **axis deer** *(Axis axis)*. These handsome spotted deer are so numerous around the park headquarters at Nagarahole and Bandipur that one tends to ignore them after a while. They are also the least shy species, congregating around the tourist rest houses at night, perhaps to avoid predators. Being partial to open grassy areas, chital are most often seen in the cleared "view-lines" bordering the "game roads." Human intrusions, such as opening up dense forests, clearing view-lines and creating water holes, have all obviously benefited chital, which tend to be less numerous in the denser more "natural" forests.

Muntja *(Muntiacus muntjak)* are small goat-sized, reddish-fawn-colored deer with a surprisingly loud bark that carries long distances in the stillness of the night, warning everyone about predators on the prowl. So the muntjac is also known as the **barking deer**. This alert little sentinel of the forest prefers the edge of dense cover venturing out only to graze or eat fallen over-ripe fruit. Usually, one gets only a fleeting glimpse of muntjac dashing for cover. But on the Nagaraja Game Road in Nagarahole muntjacs have become accustomed to tourists and can be seen at close quarters.

Chevrotain or **mouse deer** *(Tragulus meminna)* are tiny, rabbit-sized, evolutionarily early kind of deer. Though they appear to be reasonably common, going by the evidence of their tracks, they are rarely seen by tourists because of their entirely nocturnal habits.

The **four-horned antelope** *(Tetracerus quadricornis)* is perhaps the most interesting ungulate in these parks. About the size of the muntjac, but with longer legs, it has a duller brownish coat. The male four-horned antelope has two spiky horns in the usual place and two extra rudimentary knobs set a little forward, giving the species the unique distinction of being the only wild four-horned

A colony of bees.

animal in the world. It is a thinly distributed species that prefers open, dry, hilly terrain and is uncommon everywhere. Very little is known about its ecology but it is not found in the denser moist forest of Nagarahole. Unfortunately, some park staff who accompany the tourists do not distinguish it from the muntjac though it is seen often on the Russel Fireline Road of the Karapura and Moyar area of Bandipur.

Wild pig *(Sus scrofa)* and **blacknaped hare** *(Lepus nigricollis)* are two other common herbivores. The **Indian porcupine** (*Hystrix indica*) and **pangolin** *(Manis crassicaudata)* are two other species not commonly seen because they are nocturnal. The former is a rodent with a catholic diet that includes the antlers that deer shed annually. The latter relies on an exclusive diet of ants and termites. Other mammals worth mentioning are the handsome red **giant squirrel** *(Ratufa indica)*, large brown **flying squirrel** *(Petaurista petaurista)*, **giant fruit bat** *(Pteropus giganteus)*, and the secretive **slender loris** *(Loris tardigradus)*. Except the giant squirrel, these are all nocturnal and usually heard rather than seen.

Living up in the tree canopy are two kinds of monkeys. The **Hanuman langur** *(Presbytis entellus)* is a longtailed leaf-eating

low wasp.

species, extremely common in both parks. The **bonnet macaque** *(Macaca radiata)* is a versatile feeder common around human settlements but rare in the deep jungle.

The hunters: Among carnivores the least predatory animal is the **sloth bear** *(Melursus ursinus)*. It feeds mainly on termites, vegetable matter, honey and, occasionally, carrion. This short-sighted creature is sometimes preyed upon by the other large carnivores. Though bears are seen in all the areas, the best place to sight them is the Karapura Tourism Zone. If you are lucky you may see a mother sloth bear carrying her cubs piggyback.

With such a large and diverse assemblage of prey species, the Nagarahole-Bandipur forests naturally harbor many predators. **Tigers** *(Panthera tigris)*, **leopard** *(Panthera pardus)*, and the **Asiatic wild dog** *(Cuon alpinus)* also called **dhole**, all coexist in these parks.

Though Bandipur is one among the nine originally constituted Project Tiger Reserves (with 74 tigers reported in 1995), interestingly it is Nagarahole that is the stronghold of the tiger. Intensive protection, dense concentrations of large ungulate prey and dense cover, ideal for the stalking predator, have all combined to create what is perhaps the finest tiger habitat in South India. Heavy predation on gaur, including large solitary bulls, by the tiger is a special feature of Nagarahole. Yet you must remember that even here seeing a tiger in daylight is not as easy as it is in some North Indian parks. Strict avoidance of artificial baiting and the consequent lack of acclimatization to tourism is perhaps one of the reasons why an encounter with a tiger is a chancy event in Nagarahole. Tiger sightings are even more difficult in Karapura and quite extraordinary events in Bandipur.

However, if you are interested in the leopard, Karapura is undoubtedly the place to go. The forest there supports a high density of the leopard's favorite prey – the langur monkey. Leopards can be usually seen at fairly close range during an evening jeep drive, unless you are very noisy.

The wild dog is a reddish, spaniel-sized, pack-hunting canid. Unlike tigers and leopards, which stalk their prey in dense cover, wild dogs course after their prey, which is usually chital or sambar. Because wild dogs hunt mainly during the day and prefer open areas suitable for coursing, they are seen fairly often by tourists. Bandipur is the best place to see them, followed by Nagarahole and Karapura. The **striped hyena** *(Hyaena hyaena)*, another large carnivore, is found

very rarely in the scrub forests of eastern Bandipur. Reported to be more a scavenger than a hunter, it is generally not seen by tourists.

A host of smaller carnivores are also present. The diminutive **jackal** *(Canis aureus)* is the only other canid, apart from the dhole. There are three species of lesser cats: the **jungle cat** *(Felis chaus)*; the **leopard cat** *(Felis bengalensis)* and the rare **rusty spotted cat** *(Felis rubiginosa)*, all being nocturnal. There are two species of civets, the perfume-yielding **small Indian civet** *(Viverricula indica)* and the arboreal **palm civet** *(Paradoxurus hermaphroditus)*, which are also nocturnal, and four species of mongooses, the **common** *(Herpestes edwardsi)*, the **stripe-necked** *(Herpestes vitticollis)*, the **brown** *(Herpestes fuscus)* and the **ruddy** *(Herpestes smithii)*. All the mongooses are found in the tract but identifying them in the field takes some practice. The common **otter** *(Lutra lutra)* is the only mustalid recorded in both parks. Groups of otters can sometimes be seen in the Kabini reservoir.

Birds: The Nagarahole-Bandipur region is rich territory for bird watchers. An incomplete checklist of birds exceeds 200 entries. The backwaters of the Kabini sustain huge gatherings of **cormorants, teal, ducks, herons** and **waders**. The abundance of fish there, including the large **masheer** *(Tor tor)*, attracts a number of **ospreys** *(Pandion haliaetus)* and **gray-headed fishing eagles** *(Icthyophaga ichthyaetus)*. Among other birds of prey, the **crested hawk eagle** *(Spizaetus cirrhatus)*, **serpent eagle** *(Spilornis cheela)* and **honey buzzard** *(Pernis ptilorhyneus)* are all common. The **shaheen falcon** *(Falco peregrinus)*, **hobby** *(Falco subbuteo)* and the spectacular **king vulture** *(Sarcogyps calvus)* are some rarer birds of prey seen in the area.

Among game birds, **peafowl** *(Pavo cristatus)*, **gray jungle fowl** *(Gallus sonneratti)* and the quarrelsome **red spurfowl** *(Galloperdix spadicea)* are usually seen in the forest while the **gray partridge** *(Farancolinus pondicerianus)* prefers the scrub on the fringes.

The other colorful or uncommon birds seen in these forests are: **Malabar trogon** *(Harpactes faciatus)*, **blue-bearded bee eater** *(Nyctyornis athertoni)*, **Malabar pied hornbill** *(Anthracoceros coronatus)*, **great black woodpecker** *(Dryocopus javensis)*, **Alexandrine parakeet** *(Psittacula eupatria)*, **lesser coucal** *(Centropus toulou)*, **Indian pitta** *(Pitta brachyura)*, **scarlet minivet** *(Pricrocotus flammeus)*, **fairy blue bird** *(Irene pullea)*, **scimitar babbler** *(Pomatorhinus horsfieldii)*, **paradise flycatcher** *(Tersiphone paradisi)*, **Malabar whistling thrush** *(Myiophonous horsfieldii)*, **green imperial pigeon** *(Ducula aenea)* and **yellow-legged green pigeon** *(Treron phoenicoptera)*. The **racket tailed drongo** *(Dicrurus paradiseus)* and **hill myna** *(Gracula religiosa)* are the noisy birds of the day while the **owls** and **nightjars** are heard at night.

Unfortunately, the tourist cannot wander around on foot in the forests to watch birds. Considering the dangers of encounters with elephants, the park authorities have wisely forbidden such explorations. So the bird-watching is generally confined to the vicinity of rest houses and to the jungle safaris on vehicles. An early morning coracle ride from Karapura provides absolutely fantastic opportunities for bird-watching.

Reptiles: Coracle rides on the Kabini may occasionally yield sightings of **marsh crocodile** *(Crocodilus palustrus)* also. The other large reptile, the **monitor lizard** *(Varanus bengalensis)* is sometimes seen in the forests. Several species of snakes including **rock python** *(Python molurus)*, **cobra** *(Naja naja)*, **rat snake** *(Ptyas mucosus)*, **wolf snake** *(Lycodon aulicus)*, **vine snake** *(Anaetulla nastus)*, **common krait** *(Bungarus caeruleus)*, **Russel's viper** *(Vipera russelli)*, **green keelback** *(Macrophisthadon plumbicolor)* and **bamboo pit viper** *(Trimeresurus gramineus)* are also found.

The reptilean and amphibian fauna of the region include a variety of turtles and frogs also. To complete the picture there is a tremendous abundance and diversity of insect life, including many colorful butterfly species.

Getting the most out of your trip: Of the three choices there are available (Bandipur, Karapura and Nagarahole) to you to sample the splendors of the wildlife of the region, it is preferable to choose one or two if you have only limited time at your disposal – indeed this may be chosen for you by the current access status of the different parks. Two to three days are needed to derive full benefit from a visit to any one of the three. If your visit coincides with the peak of the monsoon, Bandipur is the best choice because of its better accessibility and wildlife viewing possibilities. In June and July Nagarahole and, to a lesser extent, Karapura become rain-soaked and the roads often become so muddy that you may find yourself confined to your rest house.

The forests are lush and green in the wet season. The skies are bright blue and the weather sunny and cool between October and January. But the animals are widely

dispersed and, because of the dense undergrowth, are harder to view, particularly in Nagarahole and Karapura. During the dry season, animal sightings are excellent in Nagarahole and Karapura, but generally poor in Bandipur. However, the forests are leafless and bone dry in this season.

It is important to plan your trip well in advance because accommodation is very limited in these parks and at least a month's advance reservation is advisable. It is better to avoid weekend visits to Bandipur or Nagarahole because the heavy influx of tourists will detract from the quality of the experience for the keen wildlife observer. Accommodation is hardest to get in Nagarahole, followed by Bandipur and Karapura in that order. The first two cater to the needs of a large number of domestic tourists and are priced accordingly.

On the other hand, Karapura, though more expensive, is fully geared to meet the needs of a more exclusive clientele. The **Kabini River Lodge** there, with its vast wooded compound, splendid lakeside scenery and gracious old-world air is well organized and uncrowded when compared to the rest houses in Nagarahole or Bandipur. Reservations are also easier to make because of its connections with the network of private travel operators. In Bandipur and Nagarahole reasonably priced Indian food is available at a couple of hours' notice. At Katapura there is usually an excellent Indian or Western menu to choose from. There is also a well-stocked bar, unlike the other two places where you will have to carry your own alcohol. The quality of rooms and service is also far superior at the Kabini Lodge. If you have booked your accommodation at Nagarahole, you very rarely run the risk of a last-minute cancellation because of a visiting VIP.

Bandipur is about 50 miles (80 km) from Mysore city and is on the excellent highway that goes to Ooty. It is well connected by buses to both places. There are only one or two buses a day that run between Mysore and Nagarahole, covering the distance in about three hours. Karapura is the most difficult to reach on such public transport. Though a few buses running between Mysore and Manandawadi in Kerala pass through it after a painful three to four hour journey from Mysore, a one-mile walk to the Kabini Lodge awaits you. For a visitor short on time a two-hour taxi ride from Mysore is the most convenient way to reach any one of these three places. Even though Bandipur and Karapura can be reached at any time of the day, you will have to enter Nagarahole before

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six in the evening because the route is closed to all traffic at night. In any case, it is better to reach there early rather than risk encountering an elephant roadblock late in the evening.

In all three places, tourists are taken into the forest to see wildlife in jeeps or vans between 6 and 9am and between 4 and 6pm. These trips are on specially laid-out dirt roads called "game roads," which usually pass close to grazing areas, salt licks and water holes. The undergrowth is cleared to a distance of about 32 yards (30 meters) on either side to improve visibility and to attract herbivores to the sprouting grass. Usually an excellent view of most common species can be had at a range of 15–20 yards (14–18 meters) particularly if total silence is observed by all the passengers in the vehicle. The experienced drivers of these vehicles generally keep at a safe distance from elephants. A Park Guard accompanies the visitors and is reasonably good at spotting large animals. As a rule he is quite useless at identifying birds and smaller mammals. The trained naturalists of the Kabini Lodge who accompany tourists in Karapura are far better in this respect. You are strictly prohibited from getting down from the vehicle. The jungle ride usually lasts about an hour and a half and payment is on the basis of distance traveled.

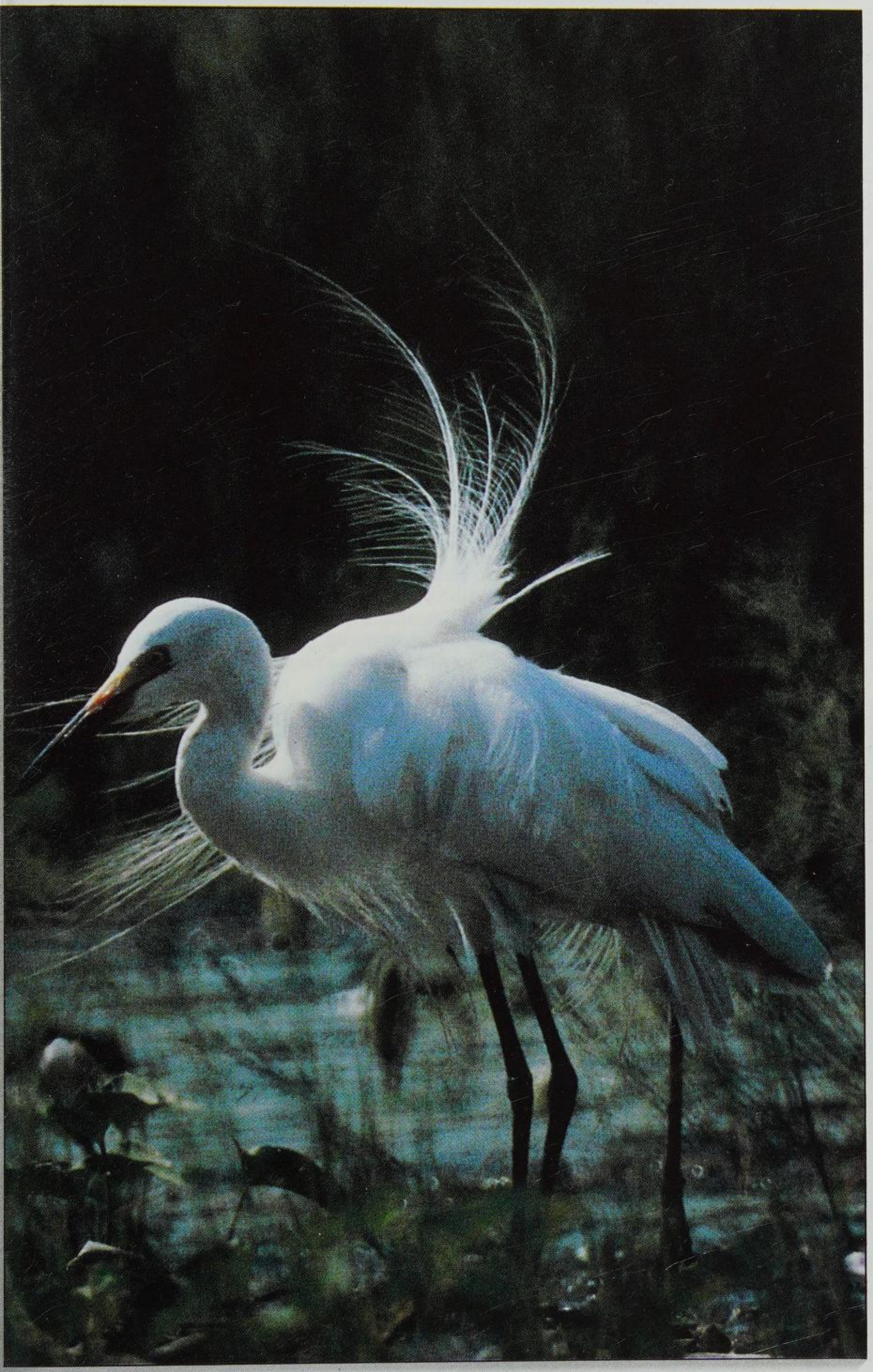
Kabini Lodge offers facilities of coracle rides on the river. (A coracle is a round-country boat made of bamboo and buffalo hide.) Special permission from the park authorities is needed for the use of watchtowers in the forests.

Those who are keen on photography should carry at least a 200mm telephoto lens. Because of the low light levels under the forest canopy, a big aperture setting and fast film (200–400 ASA) will give you more photographic opportunities.

Special attractions: In Bandipur, a spot called **Rolling Rocks**, where you get a superb panoramic view of the Moyar Gorge is well worth a visit. An hour's drive in your own transport during the non-wildlife viewing hours will take you to **Gopalaswamy Betta** from where a wonderful vista of the entire region stretches before you. There is also an interesting temple on the hill.

You can profitably combine your trip to Bandipur-Nagarahole forests with visits to the **Ranganathittu Bird Sanctuary** and other interesting tourist spots near Mysore city. About 8 miles (13 km) from Mysore is the battle-scarred town of **Shrirangapattanam**, once Tipu Sultan's capital.

Below, a gaur and right, the egret was once hunted for their plumes used to decorate turbans and ladies' hats – hence the term *aigrette*.



MUDUMALAI "ANCIENT HILL RANGE"

The large area originally known as Wynad on the northeastern slopes of the Nilgiri mountains now holds three parks in three states. The Wynad sanctuary in Kerala to the west; Bandipur Tiger Reserve in Karnataka to the north; and Mudumalai in Tamil Nadu to the South.

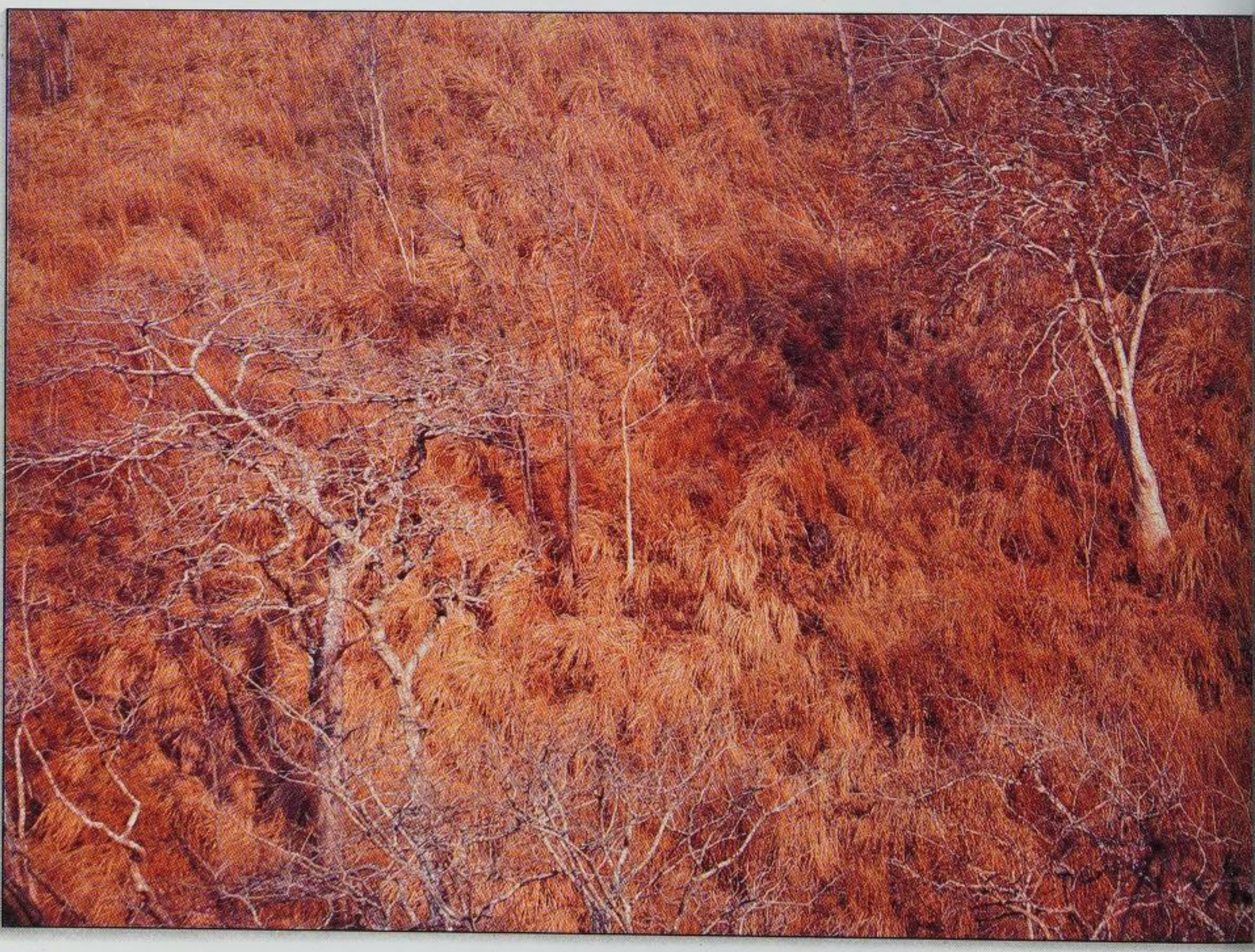
The word mudumalai has the same meaning – "the ancient hill range" – in each of the languages of these three states.

The Moyar river flows north through the park and then turns east to form the northern boundary of Mudumalai, separating it from Bandipur. The park is split by the Mysore-Ootacamund highway running north-south and following the left bank of the Moyar river. Despite being only 116 sq miles (300 sq km) in area, Mudumalai has a great variety of attractive habitats.

As with the parks at Nagarahole and Bandipur, Mudumalai is periodically closed due to the activities of smugglers, *dacoits* and poachers. Check with the park authorities before you travel.

Birdlife: The birdlife is rich and extensive. The variety includes the beautiful **Malabar trogon**, the **Malabar gray hornbill** and the **Malabar great black woodpecker** with its magnificent crimson crest contrasted by its black body. The leading avian predator in the drier and more open forest areas of Mudumalai, where it is fairly common, is undoubtedly the **crested hawk-eagle**. The **crested serpent eagle** is also found. Although rarely seen, many owls can be found in the different forest types. The **common scops owl** and the **little scops owl** are more often heard while the **tiny-eared owl** uses its brown marking to merge with the trees. During the summer, many of the resident song birds such as **barbets**, **mynas**, **parakeets** and **cuckoos** fill the forest with their calls.

Elephants, predators and prey: While the Moyar river forms a political and administrative division, the herds of **elephant**, **gaur** and other animals move freely between Bandipur, Mudumalai and the neighboring forests. The great feline predators are only rarely seen although the **tiger** is present throughout the sanctuary. **Leopards** are most often seen in the Kargudi area. The other important predator in the area is the **wild dog** or **dhole** *(Cuon alpinus)* which hunt in packs.



Mudumalai in the dry months

In 1968 an epidemic of rinderpest reduced the great herds of gaur to a few scattered groups in the outlying forest. As in Bandipur, these small groups are now returning to their old grazing haunts. Although the large herds of over 80 that used to be found at Theppakkadu are regrettably no longer seen, smaller composite herds are regrouping with two or more master bulls leading their respective groups.

The elephant population seen in various herds throughout Mudumalai is made up of animals migrating through the area on a seasonal basis looking for fresh fodder. Many of the old migratory trails along the Western Ghats are now cultivated hillsides and valleys. Those routes through Nagarahole, Bandipur and Mudumalai reserves continue south and west into the remnants of the great forest areas of Kerala.

The two most common species in the sanctuary are the **chital** or spotted deer and the **sambar**. Both have definite local variations. The chital are usually seen in small groups throughout the sanctuary except in Benne to the southwest. In the southeast, however, near the well-watered open grasslands of the Masinagudi area, larger herds are found. At Viewpoint near Masinagudi herds of over a hundred are often seen.

Sambar are found throughout the park, but except for those in the Avarahalla-Manradiar area, they are quite small. In the Avarahalla area, however, the stags have a very distinct local identity, being much darker than usual but with smaller antlers.

Another deer seen here is the solitary **barking deer** or muntjac, which lives in the same forest habitat as the chital. An unusual sight, but more often seen here than elsewhere in India, is the tiny **mouse deer** or Indian chevrotain *(Tragulus meminna)*, usually camouflaged with its light-cream mottled pattern on its brown coat.

Of the other mammals, the **wild boar** is the one most often seen, especially along the streams, on the banks of pools or crossing a culvert. In the clearings near Theppakkadu in the north and at Kargudi at the center, both **bonnet macaques** and **common langurs** are found. Occasional sightings of the **giant squirrel** are made, although they are more often only heard. **Flying squirrels**, being nocturnal, are rarely observed.

The only reptile regularly seen is the **monitor lizard**, especially along the road to Mayar powerhouse in the northeast corner.

As in most of the region, the best period for game-viewing is the summer months (March–June).

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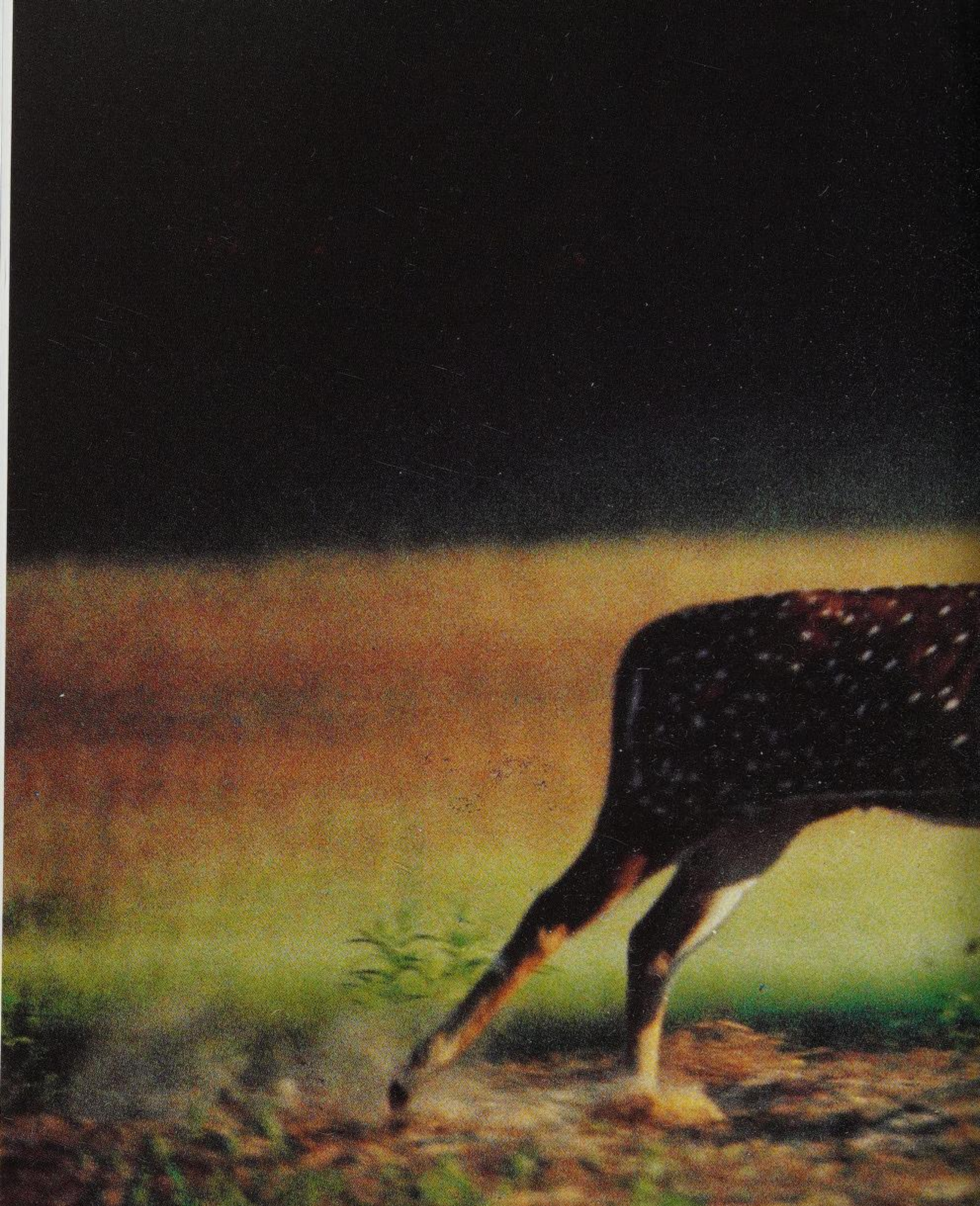

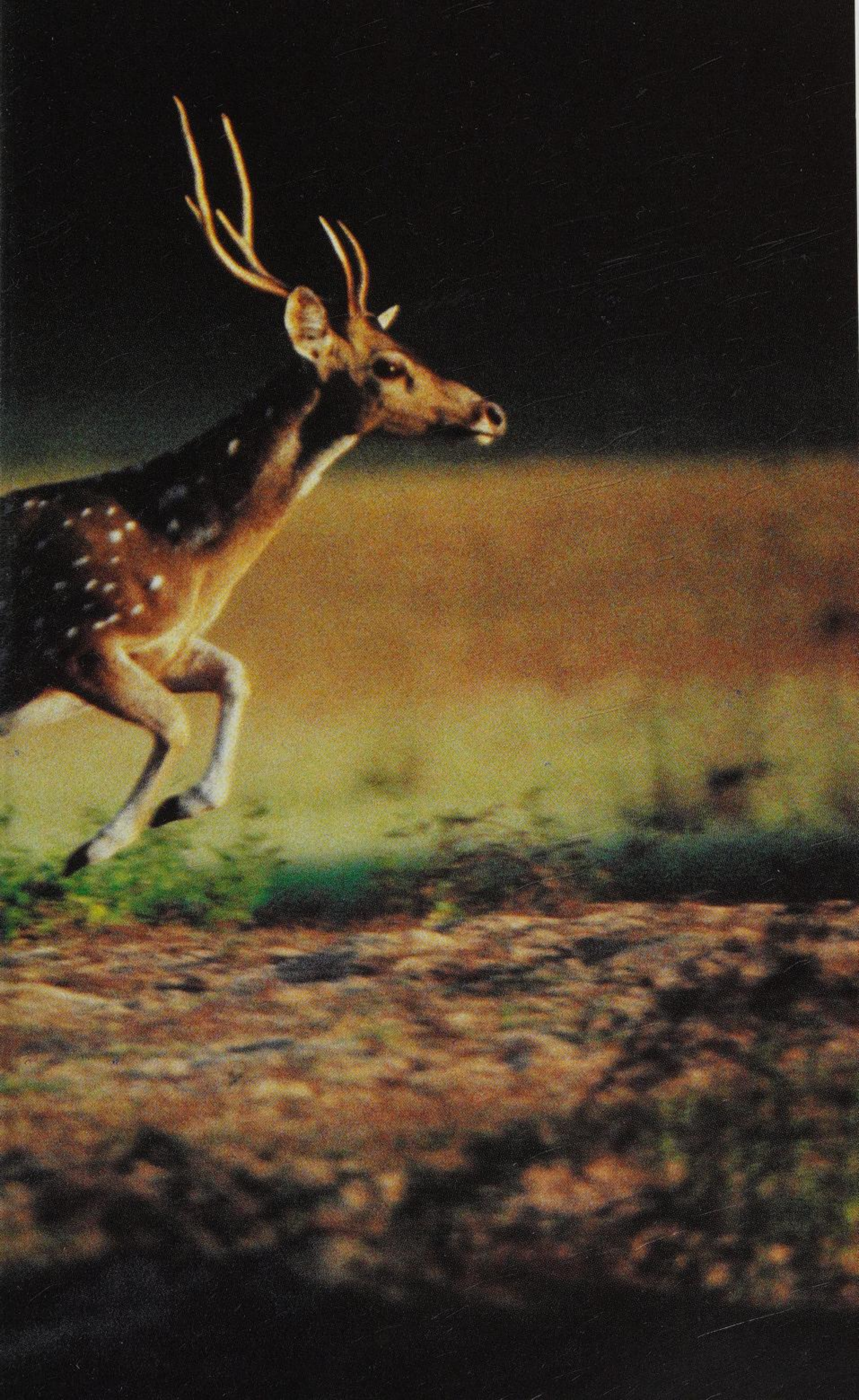

PICTURESQUE PERIYAR

The Periyar Wildlife Sanctuary, now one of the 23 Project Tiger Reserves in India, is an interesting example of how development need not be incompatible with the requirements of wildlife. A hundred years ago, a British engineer, Colonel J. Pennycuick, conceived a design to dam the Periyar river, which runs through some of the most spectacular forests of the Western Ghats in Kerala state in South India. The dam was constructed in 1895 and the adjoining forests protected by the Maharaja of Travancore. Today the 300-sq-mile (777-sq-km) sanctuary is a Tiger Reserve. The actual reservoir is 21 sq miles (55 sq km) and it meant that the best valley forests were submerged and lost. The black stumps still to be seen jutting out of the water, which are an eerie and wonderful sight in the early winter mornings as the mist rises, are the only remains of the richly vegetated valley. But the dam also made some compensations. Periyar has become one of the most picturesque wildlife sanctuaries in the world and is enjoyed by over 300,000 tourists every year. For the animals, the reservoir and surrounding forests provide protection and a perennial water supply.

The best time to visit Periyar is between October and April, thus missing the southwest monsoon period. During March and April, when water gets low and the grass dries out, animals have to spend more time near the lake and elephants are especially dependent on the lake during this period. This is the time of year when they can often be seen bathing and swimming, both to cool off as well as to get from one feeding area to the next. The grass is also short during this time of year and animal visibility thus increased.

Hotels include, **Aranya Nivas** and **Periyar House** in the tourist complex area, the **Taj Garden Retreat** and the **Spice Garden**, and the **Lake Palace** at Eddapaliyam. There are several rest houses that may be booked in advance and that are in prime wildlife areas and are very reasonably priced.

Since boat travel is the only means of transport within the sanctuary (cars can go only up to the tourist center), large areas can be covered in a short time and a 3/4-day stay is satisfactory, with boat rides in the morning and evening and animal and bird watching on the lake shores in between. Sitting on the steps at Eddapaliyam, the visitor can regularly watch **gaur**, **elephant** and **wild pig** on the opposite bank.

However, for the more deeply interested visitor or naturalist who has the time and inclination, a longer stay is certainly worthwhile: Periyar is a truly spectacular sanctuary. Although walking into the sanctuary on one's own is discouraged by the Forest Department, it is possible to go on treks with guides and there are watchtowers overlooking pools that can be used. It must be remembered, however, that the animals feel most comfortable and allow the closest approach by boat – though do pick a boat with the smallest number of people, the larger boats are very noisy and scare the animals away.

The only flat areas of Periyar are the marshy grasslands at the ends of the fingers of the lake. The typical habitat is rolling or steep hills. The actual area covered by forest is sometimes surprisingly little, with big areas of grassland between patches of forest. But this is the hallmark of a dynamic ecosystem, that which provides dense forest cover (for shade and browse in the hot months) and, adjacent to it, rich grasslands for the big herbivores.

The forests of Periyar can be divided into four broad categories. The open grasslands, studded with fire-resistant vegetation, harbor many species of grasses such as elephant grass. This is the common dining hall of all the herbivores, from the gaur and elephant to the small wild boar and barking deer. Then we have the most deciduous forest type dominated by trees like Terminalia and teak *(Tectona grandis)*, which lose their leaves seasonally. The semi-evergreen forest occurs along wet stream areas and is often adjacent to the tropical evergreen forests. And lastly, the climax forests: the *sholas* or tropical evergreen jungle that occurs in the valleys and where one can see trees 100–130 ft (30–40 meters) high. The dense tree-canopy allows only a limited stream of sunlight through and in the moist, dark corridors, ferns, orchids and airplants abound. Also to be found here is the small but efficient parasite, the leech. Leeches live on blood and prey mostly on warm-blooded animals that periodically pass through their territory. However, there are obviously not enough game animals to go around, as visitors may find to their dismay, and a juicy human limb is always welcome.

There is probably no sanctuary in the

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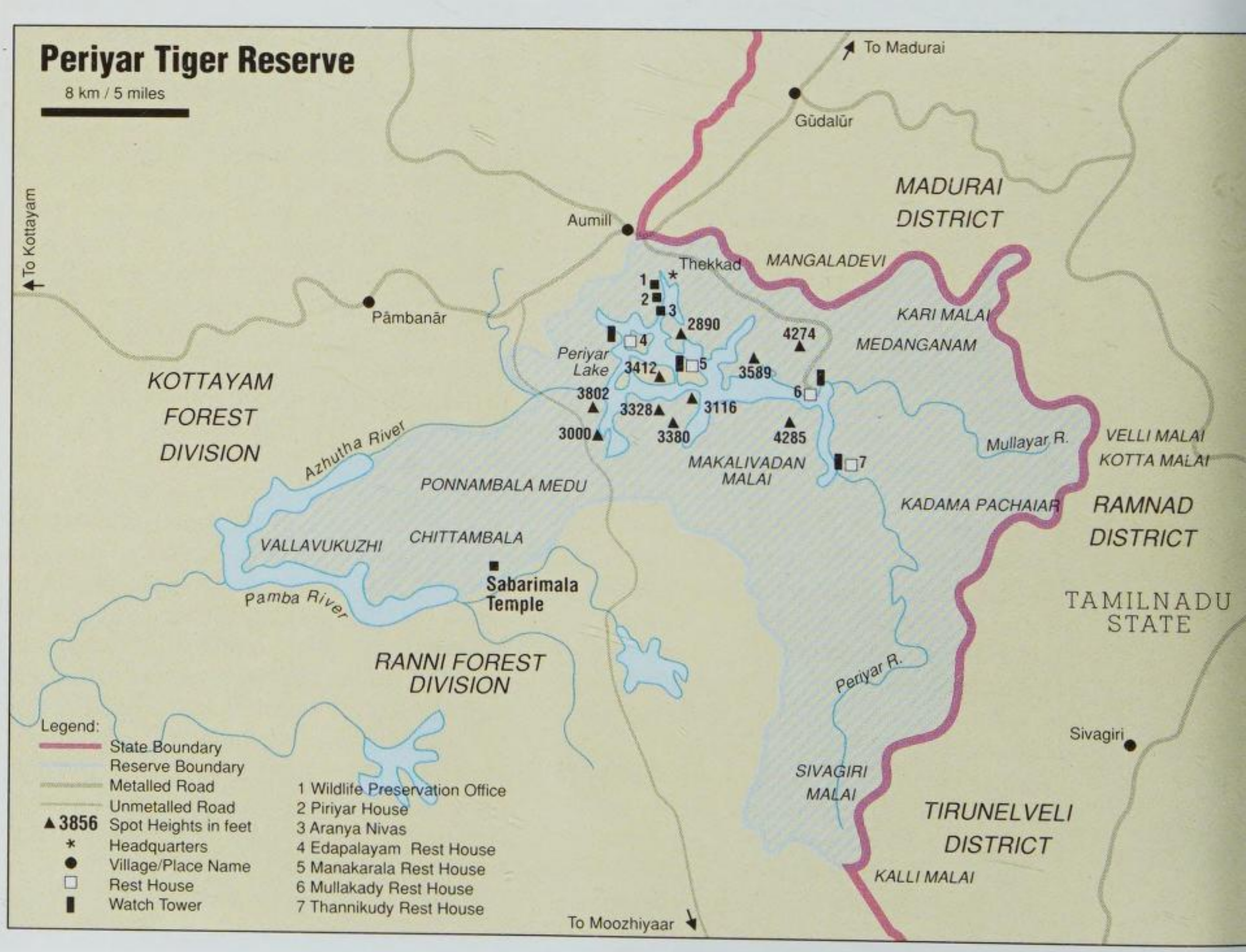
world where elephant behavior can be watched in such absolute comfort and safety. It was here that the writer and her colleagues first appreciated the great repertoire of elephant sound, some which are startlingly human. The total elephant population is about 800 and one can approach to within 20 yards (20 meters) of placid groups feeding, bathing and swimming. Often, after a swim, elephants indulge in their own brand of mudslinging; trunkfuls of dust are sprayed on their backs, an activity which may decrease parasite infestation and protect them from the sun. But whatever the reason, it is a spectacular sight.

Unlike their African cousins, female Indian elephants have no tusks. In fact not all bulls have tusks either. Tuskless males are called maknas. A male tusker is of course a magnificent animal, but it may be that the maknas are the lucky ones, because sustained poaching for ivory has wiped out most of the big tuskers in South Indian jungles. The high stakes involved make poachers increasingly daring and bold, and forest officials have an almost insurmountable problem on their hands. The ivory criminals have in recent years started hanging live wires to electrocute elephants. Also, tuskers are singled out and crippled by a shot in the knee; the helpless animal is then closely approached and killed. It is equally tragic when a wounded elephant manages to get away from its killers. People report that tuskers with a crippled leg use their tusk as a crutch for support.

Poaching and human encroachment are the biggest problems that the 150-strong Forest Department staff have to contend with. Kerala has the highest human density figures in India and Periyar is an island surrounded by human habitation. Cattle grazing has become a serious problem. Cattle within the park disturb the wildlife, stop effective grass growth and compete with the herbivores for food. But their presence in the reserve can have much more serious consequences. In 1974–75, the dreaded rinderpest disease, which fatally affects bovines and which is spread by cattle, reached epidemic proportions in South India. A thousand gaur died from it in Periyar. The Forest Department is working out a plan to ensure, through a system of ear tags, that all cattle in adjoining areas are immunized against rinderpest.

A typical sight in Periyar are the **darters** and **cormorants** that bask on the remnant poles of the submerged forest, and allow tourist boats to approach to within yards of



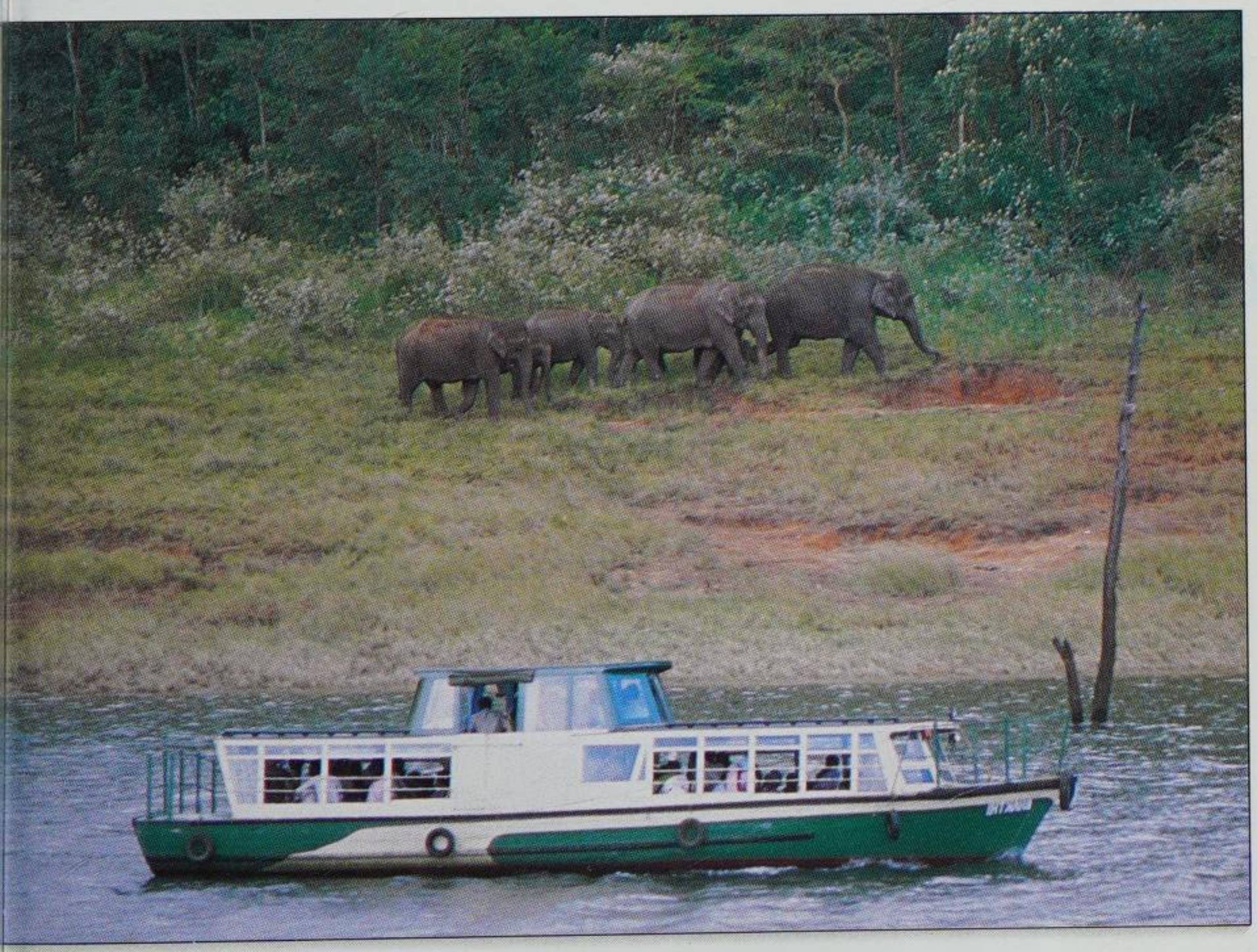
them without fear. The depth of the lake excludes wading birds but offers splendid opportunities for anglers such as **ospreys**, **kingfishers** and **kites**. Otters, also expert fishers, are a common sight, fishing in the shallows or bounding along the shore with their wet fur gleaming in the sun.

Both the **great hornbill** and the **gray hornbill** can be easily seen in Periyar. Several fruit trees just around the boat landing area attract these hornbills, **hill mynas**, **orioles** and **racket-tailed drongos**. Very often, the first sign of a great hornbill is the whoosh, whoosh, whoosh of its wings as the heavy bird flies overhead. Both hornbills have a somewhat hysterical laughing call, one of the loudest sounds of the forest. Above the forest office at the boat landing, a family of storks have nested for decades in a very tall tree.

Apart from elephants, another herbivore commonly seen in the wild pig. Sounders of 30 or 40 animals are common in Periyar. With its stiff upright mane and disgrunted expression, the pig lends a comic touch to the Periyar scene. The wild pig is an opportunistic feeder and not wholly vegetarian; at Point Calimere on the Tamil Nadu coast, they even dig up and eat the eggs of sea turtles. **Sambar**, **barking deer** and **mouse deer** are the representatives of the deer family in Periyar; interestingly, the spotted deer or chital is absent. An experiment was tried several years ago and a group of chital released on an island in the sanctuary, but they apparently didn't survive. Some of the high hill crests within Periyar are inhabited by the last **Nilgiri tahr** in the area but they are generally too shy and elusive to be seen.

On rocky shelves called paarai along the lakeshore one may see a large **dark monitor lizard** basking in the midday sun especially in the cooler months. **Pythons** are fairly regularly seen by the trekking guides and in the evergreen areas an occasional **king cobra** is sighted. Among the smaller reptiles, two spectacular species are the **flying lizard** and the **flying snake**. The flying lizard is hard to see because of its cryptic lichen-like coloration but gliding from one tree to another, its wings are brilliant yellow or orange. An observant naturalist can spot them on a sunny tree trunk by patiently looking for the male, who flaps a tell-tale yellow dewlap or throat flap. The flying snake on the other hand is one of the most colorful snakes in the country with a brilliant pattern of yellow and black, with reddish rosettes. Flying snakes don't really fly, of course, but can launch themselves and flatten their bodies to

Periyar, ephants are st viewed m boats.



make an extended "flight" to a lower branch or tree. Yet another flying creature is the **flying frog**, not uncommon in parts of the sanctuary especially during the rains. It "flies," or glides, by extending its toes, which are all connected by extra-wide webbing.

Among the predators of Periyar is the **wild dog** or **dhole**, which is fairly commonly seen along the lakeshores and adjoining forests. There are about 50 packs of these carnivores here and they hunt deer, wild pig and other game collectively and alone. Sometimes you may hear the high-pitched, eerie whistle of a wild dog on the hunt. Prey animals typically run to the lake to escape. Wild dogs are much maligned for their so-called "cruelty" and in the past were shot even within sanctuaries, as vermin. In fact, wild dogs are important predators in the food chain of the jungle. As for their cruelty: every carnivore from tigers to spiders must kill for food.

There are several animals that can be seen around the rest houses and other habitations within the sanctuary. After dark, **porcupines** and wild pig scuffle around garbage dumps and vegetable patches. There are four species of monkeys here: the rare and endangered **lion-tailed macaque**, the **Nilgiri langur**, the **common langur** along the eastern boundaries, and the **bonnet macaque** around peripheral areas of the sanctuary. The beautiful **Malabar squirrel** allows fairly close approach at times and one can often hear its loud, excited chatter in the trees. Another large squirrel that lives here is the **flying squirrel** but, being nocturnal, watch and listen for it on bright moonlit nights. It makes spectacular glides between trees, which may extend to 200–300 yards (180–280 meters). Flying squirrels make a fairly loud, plaintive cooing sound that is distinctive if you know what to listen for.

The lucky tourist may even see a **tiger**, which is at the apex of the food chain and which was not long ago in danger of becoming extinct. At the turn of the 20th century there were over 40,000 tigers in India. But sport hunters and commercial interests persecuted the animal so relentlessly that by 1962 less than 2,000 animals survived. Together with the World Wildlife Fund, the Government of India launched Project Tiger, with a million dollars raised by the WWF to save the animal and its habitat. Project Tiger has been fairly successful. There are now an estimated 39 tigers in Periyar, which seem to be holding their own with little or no increase in numbers.

Mating damsel flies.

If you express a particular interest, for example birds, primates etc., the Forest Department is most helpful and the guide provided for trekking, usually from the Manan people and with a vast knowledge of the natural history of the area, will be able to point out things of particular interest. Daytime as well as nighttime periods can be spent on watch-towers, away from the main tourist activity. Shy, timid animals like the gaur, India's largest bovine, prefer the seclusion of the swampy grasslands near Eddapaliyam and other areas associated with watchtowers.

With special permission and an accompanying guide, one can trek or boat to the source of the Periyar Lake, the **Periyar river**. This is in the core area of the park, normally not open to visits, and the rest house situation there is known as **Thannikudi**. From here, armed guards patrol a huge 85-sq-mile (220-sq-km) beat to guard against animal and wood poachers. The Periyar is a beautiful, clear river and it is not uncommon to see the dark shapes of yard-long **mahseer**, a fish made famous by hunter/writers such as Jim Corbett, gliding just beneath the surface. Here in Thannikudi the **sloth bear** is common; its signs are everywhere. This is also where tigers can live in peace, away from the main forest activities that are still permitted within the sanctuary.

There are a few Adivasi villages near the sanctuary. Among the Adivasi peoples in this area are the Manans and the Oralis; the latter still build tree dwellings, these days not so much as residences but as watchtowers to keep animals like wild pig, sambar and elephants from their crops. The Manans are expert fishermen and fish the lake and the clear streams that run into it for mahseer. A few Manans traditionally practice the dangerous exercise of collecting the honey of **hill bees**. These are large and potentially dangerous bees that build massive hives high in the branches of rainforest trees such as the silk cotton, Bombax . For climbing to these often 100-ft (30-meter) high honeycombs, they carve bamboo spikes, which they hammer into the tree with a wooden mallet. They only do this at night to avoid being stung, and sometimes collect 55 lbs (25 kg) of honey at a time from one tree.

Spending a few days in Periyar is a unique and unforgettable experience. Here is one sanctuary where you never travel by road; no traffic noise, no dust, no bumps. Most importantly, one is not trespassing on the animals' territory.

tortoise.

Sri Lanka

40 km / 25 miles

Legend:
- Park Boundary
- Railway
- Main Road
- Trunc Road
- Village / Place Name

Kankesanturai
Jaffna
Mullaittivu
Talaimannar
Mannar
Vavuniya
Trincomalee
WILPATTU NATIONAL PARK
Anuradhapura
Hunuwilagama
Habarana
Minneriya
Puttalam
Polonnaruwa
Sigiriya
Dambulla
Manampitma
Batticaloa
WADURU OYA N.P.
Chilaw
Kurunegala
Maha Oya
Kandy
GAL OYA N.P.
Amparai
Nuwara Eliva
Badulla
Colombo
Avissawela
Pottuvil
Beregala
Rathnapura
YALA EAST N.P.
Okanda
RUHUNA N.P.
UDA WALAWE N.P.
Timbolketiya
Hambantata
Galle
Matura

Bay of Bengal

Indian Ocean

SRI LANKA'S UNTAMED TREASURES

Two of Sri Lanka's most precious and purest gems do not lie hidden in that primeval gravel called illama that lies beneath the island's layer of alluvial clay; they are found on the surface, spreading over a fair area of her ancient face in a rich and varied pattern. They are her jungle and its denizens.

In its area of 25,000 sq miles (65,000 sq km), Sri Lanka's wild terrain varies from primeval and deep secondary forests down to rolling thornbush plains and the mangrove swamps of the dry zone; from the floodplains of the Mahaveli basin, the home of the great marsh elephant, to the closely knitted steaming jungles of the wet zone and up to the lichen-covered beauty of the mist-draped stark montane forest. One-tenth of Sri Lanka's entire land area is under the jurisdiction of the Department of Wild Life.

The denizens, both feathered and furred, of this diverse habitat, from the treetops to the leaf-covered forest floor are varied and fascinating.

Of her exciting endowment of birds, in excess of 425 different kinds, 251 are resident and the rest are migrant. Among the residents are 21 species and 81 subspecies that are endemic.

Sharing the treetops with the birds is an array of other creatures like the slender loris, five subspecies of monkeys (two of which are confined to the hills), two subspecies of giant squirrel and a flying squirrel.

Treading the forest floor and plain are a single species of wild boar and four species of deer, the commonest of which is the "spotted", which is found in large numbers in all the national parks.

Sri Lanka's "big four" are the elephant, buffalo, leopard and bear, all except the leopard confined to the dry zone and the foothills of the wet zone. The leopard spreads into the hills also, where, in fact, it thrives.

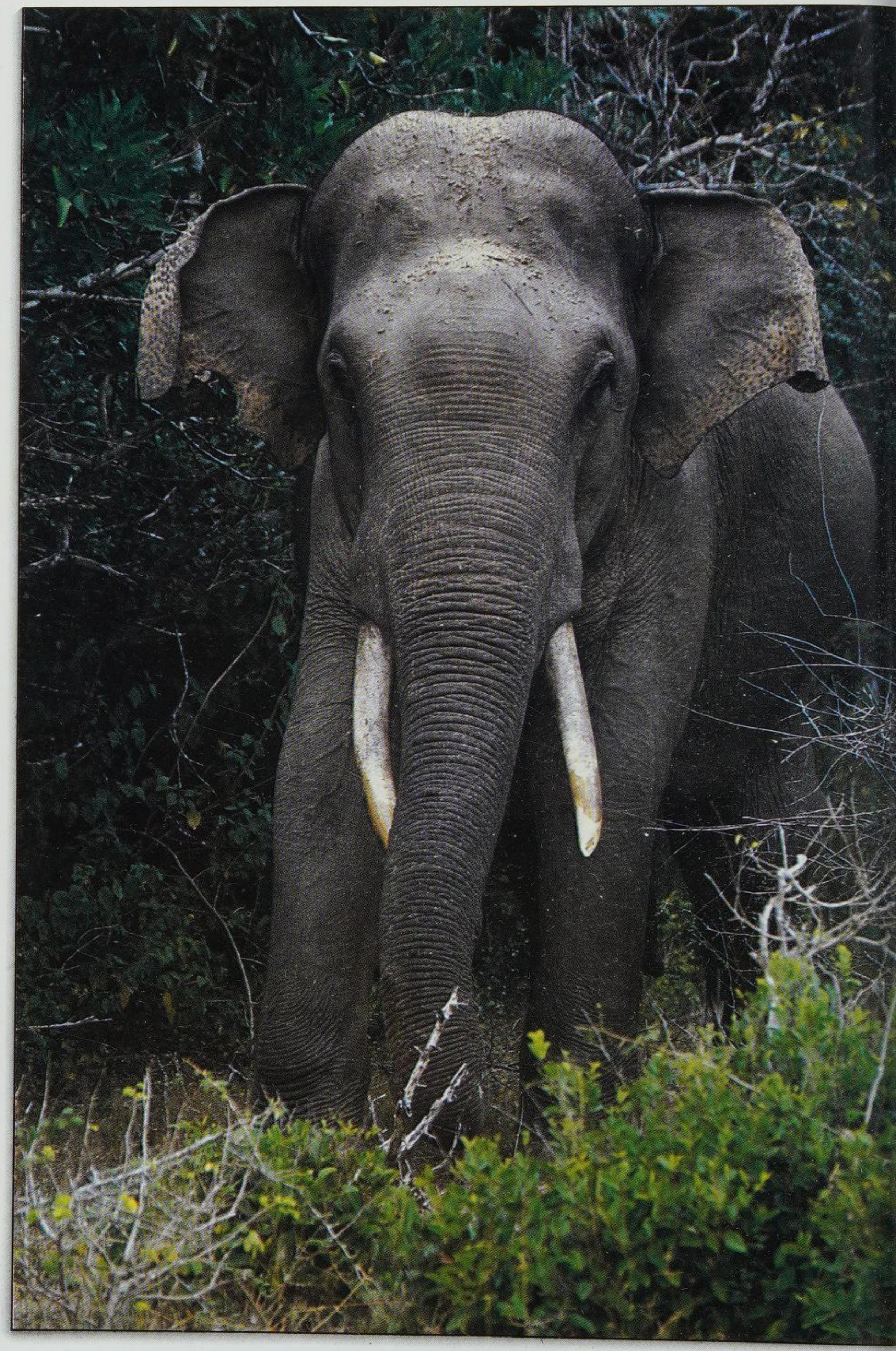
Confined to the floodplains of the Mahaveli are the giant marsh elephants. It has yet to be established whether they are a subspecies or their stature is due to their environment.

In the annals of Sri Lanka's wildlife, only two man-eating leopards have been recorded. The more famous Punani leopard was shot in 1923, after 20 known human kills.

Following the noble traditions of the ancient Buddhist kings, the Department of Wild Life, backed by the state, has launched a series of tough and costly measures to protect these untamed treasures against both wanton destruction and "inadvertent" destruction through short-sighted implementation of development projects.

The greatest conservation efforts are being directed towards the elephant. A contiguous system of national parks, jungle corridors where possible, and updated conservation law, with severe penalties, and the translocation of "pocketed herds" to areas of better sustenance, are just a few aspects of this enormous program. These form the base for the overall plan for conservation of all wildlife in the island.

Peceding pages: rhododendron, Horton Plains, Sri Lanka; bull elephants, Buttawa, Yala National Park.



WILPATTU NATIONAL PARK

Eighteen miles (30 km) south along Route A 12 from the ancient Sri Lanka capital of Anuradhapura is a little evergrowing hamlet amidst green surroundings known as Thmbiriwewa. At this spot is the turn-off to one of Sri Lanka's most beautiful national parks, Wilpattu.

Two of the main topographical features of this park are its *villus* and the copper-red, loamy, fine sand. *Villu* is a Tamilized version of the Sinhala word *wila* meaning lake. Most of the Wilpattu *villus* are fairly large, spreading over many acres and do indeed look like lakes; they are not true lakes, however, but rather basin-like pans on the earth's surface. It is interesting to note that Sri Lanka does not have a single natural lake, and all the 11,200 "lakes" or tanks, as they are called, in the north-central area and about 5,000 in the southern sector are man-made, built by ancient monarchs to irrigate the vast agricultural areas.

These crater-like basins of the *villus* are peculiar to this sector of the island, and the greatest concentration of them is to be found within the park. They have no ground-water, only the water that the rains have brought. In fact, at certain spots, almost by the villu, the water table is as far down as 60 ft (20 meters).

Two of the villus within the park are saline: **Kokkari** and **Lunuwila**, the latter literally meaning "salt lake". There is still no satisfactory explanation as to how these became salty, but it could be due to a constituent in the soil that becomes progressively concentrated as rain follows drought and so on. The degree of salinity of these *villus* is as high as that of the sea.

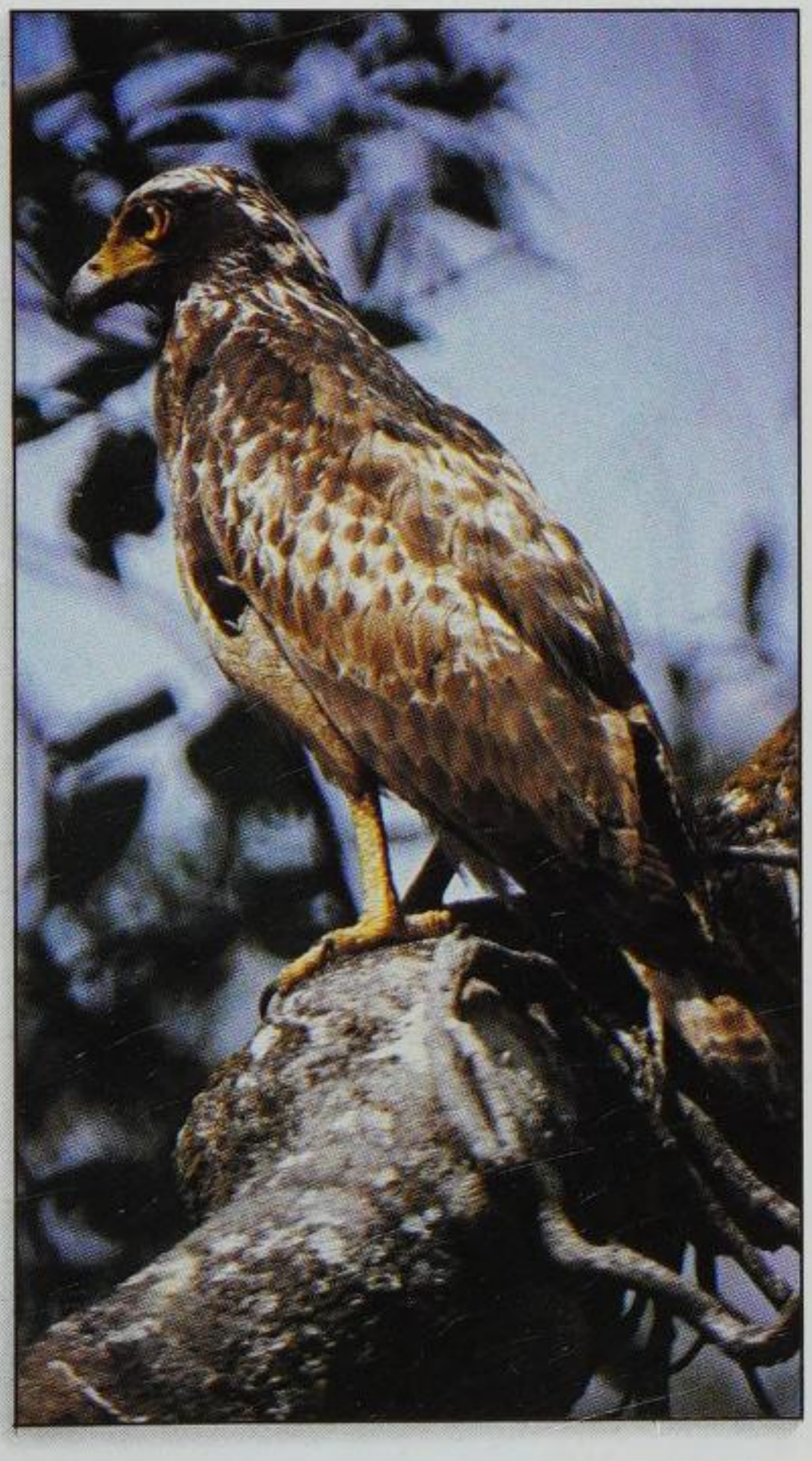
Watching at Villus: Almost all the *villus* are surrounded by parkland and are very rich in scenic beauty. They are the finest places in the park to observe animal and birdlife, especially in the mornings and evenings. Even on those chance occasions when one does not encounter any animal life at the *villus*, it is still worthwhile to drive around and absorb the beauty and the serene atmosphere.

Another striking characteristic of the park, confined to the western sector, is the red sand, so fine that it will go through the finest sieves. This sand blankets the western coast of the island from north of Chilaw to about Mannar and is characteristic to this part of the coast. It is this coppery loam that is said to have prompted the ancient mariners, which is blown to the west coast by the southwest trade winds, to call the island Tambapanni, the "land of copper sand".

The park has a fairly varied forest pattern. A better part of it is deep secondary forest, but opening out at intervals into sandy glades. The dry thornbush country, reminiscent of Yala, is found in the western sector. Large sand dunes and beds are found throughout the park, where one finds hints of a past submarine land, perhaps during the Middle Tertiary Period.

Leopards: The **leopards** of Wilpattu, for which the park is famous, are not as shy as those at Yala. Often, they walk up to a vehicle. Visitors are, however, well advised to stay as quiet as possible and to avoid any sudden movement when a leopard is in the immediate vicinity. The best time to see these magnificent cats is the early morning hours and the late evenings. Keep a sharp look out in the sandy areas and the edge of the *villus* as you drive around, and let your eyes wander up those magnificent umbrella-shaped trees also.

Though not seen as often as leopard, **bears** too can be observed fairly easily in this park,



tusker, National and Ceylon eagle.

if conditions are not too dry. However, if one is specially keen on seeing bears, one should plan the visit around late May and June when the palu *(Manilkara hexandra)* and the veera *(Drypetus sepieria)* are in fruit. If you have a sharp shower of rain while you are in the park, get on the track about an hour later and carefully approach the anthills that litter the park, and you are bound to see the bear sucking up their occupants with his long snout, like a vacuum cleaner. The water holes too are frequented by bears during the late mornings as the sun gets warmer.

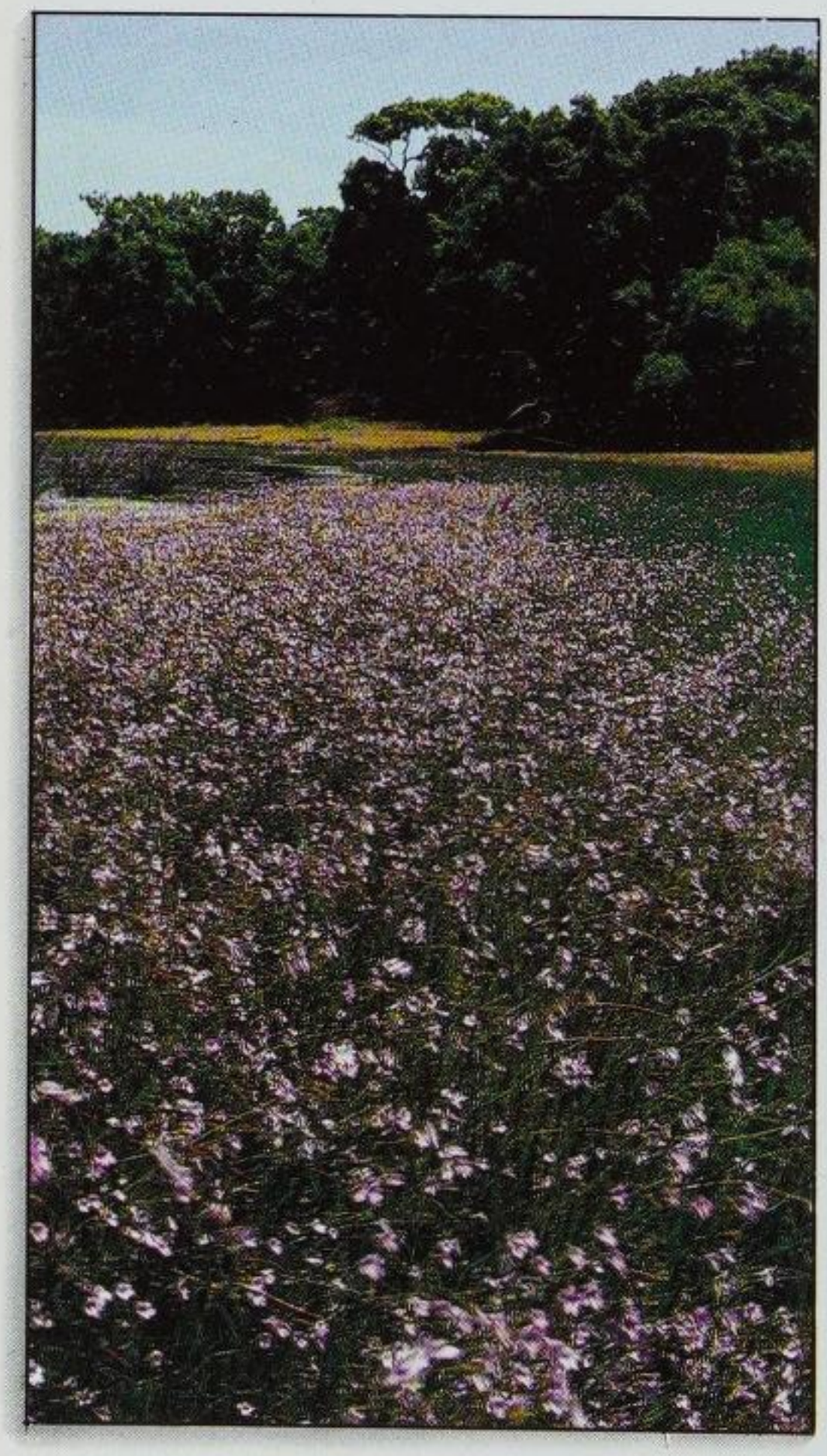
Wilpattu is not elephant country, yet there is a fair population of these great creatures within the park, and also herds that migrate in and out. But one hardly ever sees them here as they are extremely shy and prefer to stay well under cover during the daylight hours, though, on rare occasions, some lucky visitors have encountered large herds. The occasional loners are known to visit the lodges if there isn't too much disturbance from the occupants. Kalli Villu would be the finest place to see elephants from during the dry months, and herds of over 30 have been seen from here. A day spent at **Pomparippu** in the western sector during this period may also bring results.

The extremely shy and wary **barking deer** and **mouse deer** can both be seen in Wilpattu more easily than anywhere else in the island. This will, however, need a bit of special effort. One will have to spend some time watching quietly at a water hole (your guide will recommend a good one), and your efforts will be rewarded before long.

While touring the *villus*, watch for the **crocodiles** and **water monitors**. Even the two saline *villus* have crocodiles in them, and some of them are extremely large.

Birds: During the migratory season, Wilpattu is packed with birds. Even at other times, due to the conditions in the park, almost all avian types in the island, except those that are confined to the hills, can be seen. The best place to observe birds from is the villus, and the little water holes, which are fairly deep in the jungle but easily accessible. In the deeply forested areas one will come across the more uncommon types such as the **red faced malkoha**, the **Ceylon trogon** and the **shama**. Birds of prey are numerous, and lodge residents should keep an eye open for the magnificent **forest eagle owl**.

There are lodges in the park, where the visitor can stay. However, access may be periodically restricted due to the ongoing struggle between the Tamil Tigers and



Pannikar Villu, Wilpattu, is one of the many water holes

government forces. It is best to check with the park authorities – who will be able to give you up-to-date information on the current state of access – before planning your trip or travelling.

Driving around: The park is interlaced with about 150 miles (240 km) of dry-weather track. The main track and also tracks to some of the bigger *villus* can be approached and traversed by motorcar during dry times and even after moderate rain, but due to the very sandy terrain the visitor who wishes to see most of the park is advised to use a four-wheel drive vehicle. These may be hired from the park authorities and through the lodges.

Unless one is a very keen wildlife observer or photographer, the best way of seeing game in the park would be to drive around the *villu* areas in a vehicle. For the enthusiast or the wildlife photographer, there is a hide at a water hole named **Danggaha Uraniya** that one can reserve for the day. Sitting there silently and patiently can be very rewarding. There are two other water holes with hides, namely **Cheena Uttu** and **Menikrala Uraniya** accessible by four-wheel drive vehicle. Prior reservation is not required.

Wilpattu is best known for its leopard.

Spending the night in any one of the lodges is an experience, some of them are especially memorable as leopards and bears have been seen just a couple of feet from the verandahs. To encourage these animals to visit, all lamps and conversation should be kept down to the lowest possible level – do not put out any food as bait.

FOR THE SPECIALIST

In addition to Sri Lanka's major national parks, a selection of which has been described in this guide, more have been set up. Two such are **Lunugamwehera** and **Bundala**.

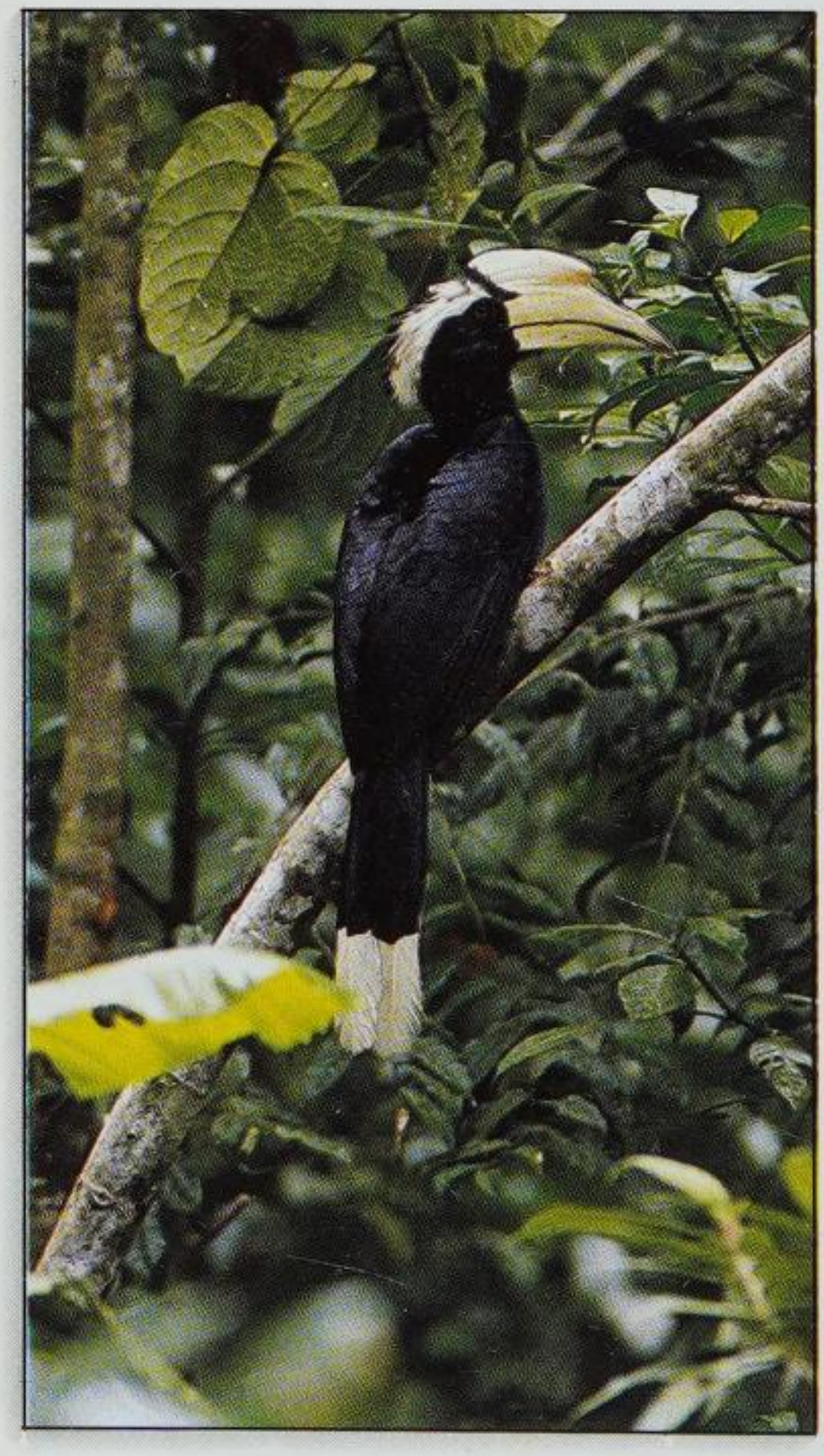
Even in the suburbs of Colombo there are two bird sanctuaries. One surrounds the House of Parliament and the other is at Bellanvilla.

There are many more national parks, and other protected areas such as strict natural reserves, where no one is permitted to enter except for purposes of scientific research. Among these are the **Somawathiya** and **Wasgomuwa National Parks**, the **Yala Block 2 Strict Natural Reserve** and the **Weeravila Bird Sanctuary**.

YALA NATIONAL PARK

Tucked away in the southeast corner of Sri Lanka, almost at the point where the south coast takes its upward curve to the east, is the **Yala National Park**, also known as the Ruhuna National Park, after the ancient name by which the south of Sri Lanka is still known.

The story of this national park goes back to the days of the great kingdom of Ruhuna or Rohana as it was then known. During that period, the area that is now the national park and a vast area surrounding it must have been fairly well developed and populated. The large number of ruins of ancient temples, monasteries and secular buildings that one sees, both within and without the park, bear testimony to this. At one corner of the large Yala plain that gives the park its name, is a fairly large tank, which is today entirely overgrown with tall elephant grass. Archeologists have identified it as an ancient irrigation tank, which supplied water to the surrounding paddy fields, including those in the Yala plain.



As the glory of the Ruhuna kingdom faded, these areas were abandoned and the jungle took over. Many centuries later, under British rule, the area was declared a Residential Sportsmen's Reserve. For a long time after that, hunters, mainly British, enjoyed controlled hunting here. Then on February 25, 1938, the British Government declared it a National Park, thus giving total protection to its fauna and flora. Incidentally, it was on this same day that Wilpattu, on the west coast, was also given the same status.

Another interesting feature in the history of this park is the ancient pilgrim route between Pottuvil and Kataragama that traverses it. Every year, from time immemorial, towards the latter part of July, pilgrims from Pottuvil, an east-coast town, and the surrounding areas start a trek that takes them to the festival at Kataragama, which lies to the west of the park and is the legendary abode of Skanda, the powerful god of war in the Hindu pantheon. The final leg of this route passes through the park, and the pilgrims who walk all the way are permitted to go through without the usual formalities. This practice has caused certain problems for the park authorities but the Government and the Department of Wild Life Conservation are compelled for two weeks each year to turn a blind eye to this disturbance in the even tenor of life in the park. During the 1900s, a man-eating leopard, later called the Pottana man-eater, appeared along this route and many pilgrims fell victim to it.

The Yala "plains": Yala country is generally open, with large grassy areas – the "plains," semi-desert-type brush and gnarled trees, often umbrella-shaped in branch formation; country that strongly reminds one of the African bush.

The term "plains" of Yala, is perhaps a misnomer. These "plains" are really large open glades of many acres that are grassy and dotted with thorny trees and scrub. Most have a couple of water holes in them and are ideal places to see a variety of game and interesting birds. The three best-known plains in the park are **Yala**, **Buttawa** and **Uraniya**.

A characteristic feature of the park is the droopy malittan trees *(Saratoga persica)*. They are evergreens and even under most severe drought conditions retain their freshness. Another plant that grows in great abundance is the beautiful Cassia auriculata, ranawara in Sinhala.

As one gets closer to the Menik Ganga (river of gems) which flows along the north-

Malabar pied hornbill.

east border of the park, the dry brush country gives way to vegetation that is more luxuriant in growth and riverine in character. The banks of the river are dominated by the mighty pale-barked kumbuks *(Terminalia arjuna)*, whose spreading branches at certain spots form almost a canopy over the murmuring water.

Another feature in the Yala scene is the large rocky outcrops strewn with boulders, favorite haunts of **leopard** and **bear**. The most famous of these is **Vepandeniya**, also known, and for good reason, as **Leopard Rock**. Three other giant megaliths are **Jamburagala**, **Patanangala** and **Akasa Chetiya** (also known as Elephant Rock due to its shape). This last one dominates the skyline and Portuguese and Dutch mariners of old used it as a landmark when sailing in these waters.

Elephant Land: Of all the national parks in Sri Lanka, Yala is undoubtedly the finest place to see a variety of species quickly and conveniently. **Elephants** are, of course, its specialty. Except during the very dry months (July–October), a visitor is bound to come across a number of these great creatures even on a half-day tour of the park. The best time to observe them is soon after the rains, when the fresh grasses have started to grow and the plains have begun to dry again. This period would be from about January to May. Soon after the rains the herds that had migrated northwards during the dry months return to the park and groups of them can be seen scattered over the plains, usually in the evening. Herds of up to 25 or more may be encountered, though this is not common. The usual size of a herd is 8–10.

Other good places to observe elephants are at the numerous water holes around midday. It has been noticed that certain herds use the same water hole continuously for three or four consecutive days, almost at the same time each day. So, it would be a good idea for a visitor who stays in the park for a few days to observe this and catch the herds at the right place at the right time.

During the dry weather, when almost all the water holes are dry, one can see groups of elephants coming down to the almost dry bed of the river and digging for water.

The **tusker** is undoubtedly the most magnificent and also the rarest animal in the Sri Lankan jungles today. Yet, not so long ago, the tusker roamed free and was a common sight before large-scale shooting took a heavy toll on their numbers. Yala could well be proud of its collection of tuskers. Observers found their numbers in

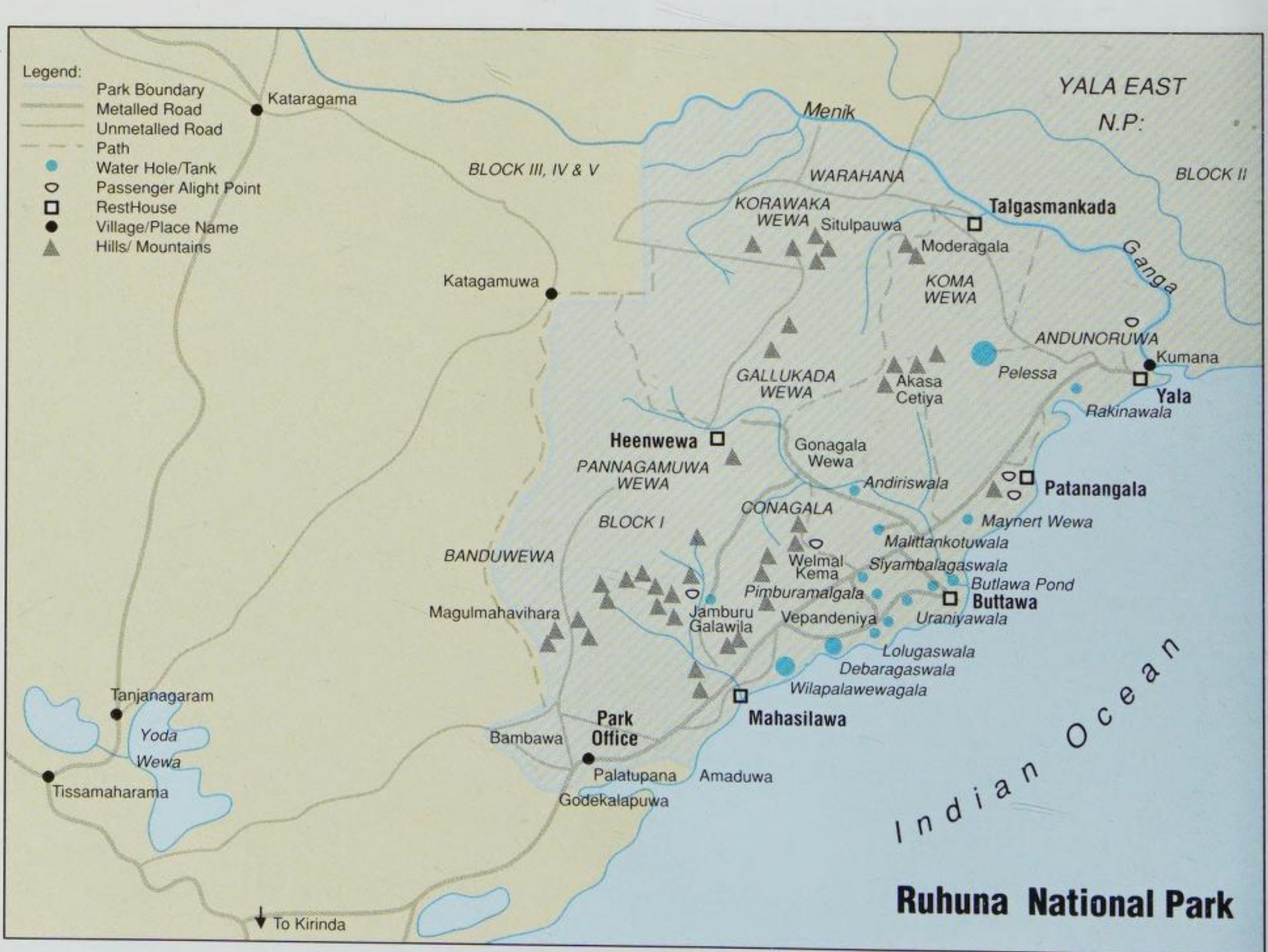
Peacock.

the park have increased during a count in 1984–86. It is currently estimated that there are some 18 tuskers in the park, ranging from a 2-ft (60-cm) calf to a 9-ft (3-meter) giant. While this is very encouraging for the wildlife lover, park authorities have a difficult time keeping these tuskers within the park, an illustration of this is shown by the fact that, despite all their efforts, one of Yala's prime tuskers was shot dead at the beginning of 1986 by poachers just outside park limits, causing a terrific outcry throughout the island. The culprits were arrested and the tusks recovered but it shows the difficulties the park authorities have in controlling poaching and other infringements.

Perhaps it would be fitting to make mention here of Raja, the greatest tusker to ever walk the plains of Yala. He was a majestic bull about 9 ft (2.75 meters) tall and had a pair of great tusks symmetrically curving inwards. At one stage of his life Raja carried a fearful wound near his right armpit, but he totally recovered from this following the administration of a direct antibiotic from a "capture gun." For many years after this Raja was seen in the park, often giving an exhibition of his terrific threat display to any visitor who came upon him unexpectedly at close quarters. When last seen, Raja carried a small wound at the top of his trunk, which nobody realized was a bullet wound, to which before long he succumbed. His skeleton was found in the park long after his death, together with the tusks, which were about the heaviest recorded in a Sri Lankan elephant.

Most of the elephants at Yala are quite used to vehicles and are easily observed. However, visitors should keep at a fair distance and follow the instructions of their guide very strictly when among these great animals.

Leopard country: The leopards at Yala are widely distributed and are seen in all sectors of the park. However, they favor the more sandy and rocky areas. Ever since the park was established, the Vepandeniya rock has had a pair of resident leopards, perhaps successive generations. Very often visitors see them sunbathing on top of the rock at dawn or dusk. During the mid-morning and early afternoon hours, these cats usually go up the trees and are seen stretched out lazily on the branches of tamarind or wood apple. The leopard here tend to be rather shy and visitors should avoid making any sudden movement when they come across them.



Except during the rains or after a heavy shower, visitors would be very lucky to see a bear. They are not uncommon but not often seen. The best time of the year to look for bear, when one is bound to come across two or three of them in a day, is late May and June, when their favorite fruits, the palu *(Manilkara hexandra)* and the veera *(Drypetus sepieria)* are ripe.

Among the other animals that may be seen both in Yala and other parks in Sri Lanka are two species of monkey (the **gray langur** and the **torque**), four types of deer (**sambar**, and the **spotted**, **barking** and **mouse deer**), **buffalo** and **crocodiles**. These crocodiles may be seen at all the water holes and along the banks of the Menik river. They are usually very wary and shy, unlike their more aggressive and larger estuarine counterparts found in the lagoons in the park.

Birds: Yala is a bird-watchers' paradise. One of the glorious sights of the park is the mating dance of the **peacock**. Between November and February even a few hours of watching will yield sights of a number of these displays.

Among the numerous avian types found at Yala is the rare **black-necked stork**. It is feared that no more than a dozen survive on the island. When they are sighted, more often than not they are seen as a pair searching for prey in the **Buttawa lagoon**.

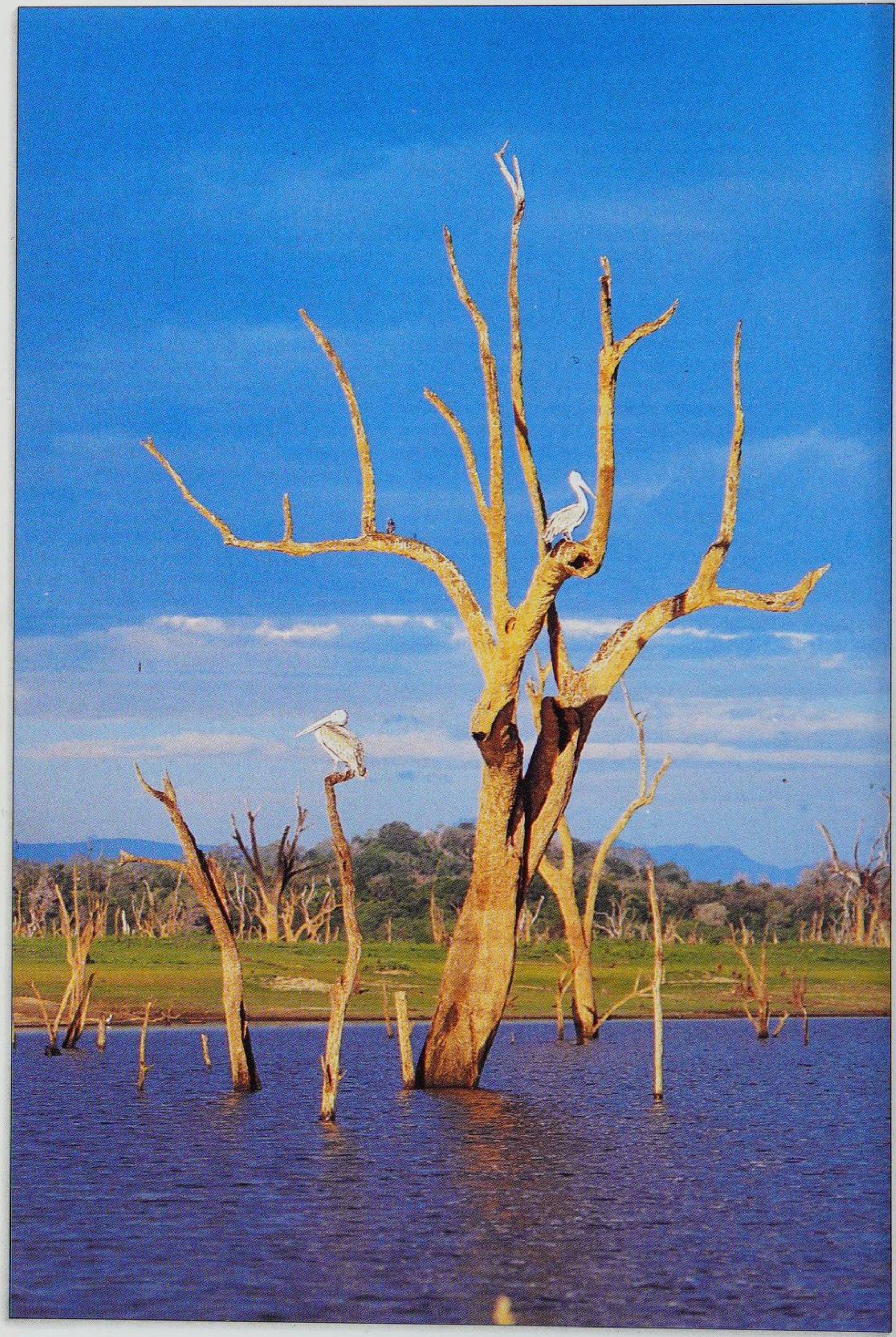
Yala offers an interesting range of birds of prey and between September and May the migrants. Visitors who stay at the lodges near the river should keep a look-out for the elusive **Indian paradise flycatcher** and one of the world's greatest songsters, the **Ceylon shama**. Two other common but intriguing birds widely seen are the **Malabar pied hornbill** and the **hoopoe**.

Yala is a well-organized national park with a total extent of 377 sq miles (976 sq km) of which only 52 sq miles (135 sq km) are used for game viewing. The park is well equipped with good quality roads and throughout the year most of it can be covered by two-wheel drive vehicles.

One of the best places to stay when visiting the park is the **Yala Safari Beach Hotel**. It is superbly situated with all the rooms looking out onto the sea, beach or lagoon. It is also well-located for seeing animals, especially elephants who at times come up to the doorstep. There are other lodges within the park and it may be possible to camp at one of two places.

The park is usually closed to visitors from August 1 to October 18 every year.

Sri Lankan palm viper.



SRI LANKA'S NATIONAL PARKS

It may not be possible to visit some of the parks in Sri Lanka as they are periodically closed due to the activities of the Tamil Tigers or the Sri Lankan armed forces.

Uda Walawe National Park: Lying south of the central hills of Sri Lanka is this 119-sq-mile (308-sq-km) park, established with the prime objective of conserving the catchment area of the Uda Walawe reservoir. Today, a large variety of game, especially elephants from the heavily exploited jungles around have found protection here and have made it their home.

Still under development, the park has 20 miles (32 km) of dry-weather road and 6 miles (10 km) of jeep track. Due to this area having been heavily exploited in the past for *chena* (slash and burn) farming, a part of the park is devoid of forest cover and, except in the months of June–September, is almost entirely covered by a tall golden grass, which makes game viewing in these parts difficult. After September, the grass dies, transforming the whole area into parkland.

Close to the river Walawe one encounters fairly heavy forest cover, which includes two species of tree not found in other Sri Lankan national parks, the mandorang *(Vatica sinensis)* and daminiya *(Grewia tiliifolia)*.

The elephants seen here are magnificent specimens and large herds wander along the river and sometimes in the plains. They are very wild and shy and make off at the first whiff of humans. Leopards and bears have rarely been sighted. The park is superb for bird-watching, especially for the more uncommon species.

It may be possible to camp, both by the river, under a canopy of large trees, amidst scenery that could hardly be bettered.

Lahugala National Park: Lahugala is one of the finest places in Sri Lanka in which to watch wild elephant.

The 6 sq miles (15.5 sq km) encompass two former irrigation tanks, **Lahugala** and **Kitulana**, which are both completely covered by a tall succulent grass called beru *(Oplismenus compositus)*, a favorite of the elephants. These two tanks lie slap in the middle of the elephant corridor that connects the Yala region to the Gal Oya region. Thus, one is almost assured of seeing elephants here, throughout the day, every day of the year. Herds in excess of 150 animals have been recorded.

While the two tanks are also famous for their birdlife, mostly aquatic types and birds of prey, the 0.25-mile (400-meter) strip of dense forest south of the tanks and north of the Heda Oya (river) offers the visitor some rare species like the elusive **red faced malkoha** and the **blue magpie**.

Leopard and bear are extremely rare here but have been seen on the road leading to the lodge and also by the tank.

The area immediately surrounding the Lahugala lodge and the rocks behind are also fine places to study a variety of uncommon butterflies.

Maduru Oya National Park: Established in November 1983, this is one of Sri Lanka's newest national parks and is still being developed. It has been established primarily to conserve the catchment area of the three reservoirs – Maduru Oya, Ulhitiya and Ratkinda – and to provide a secure home for the magnificent **marsh elephant** whose environment has been depleted by agricultural development. Also a proposed corridor to Gal Oya will complete the chain of connected National Parks ending at Yala in the south.

At present, the park is fairly open country consisting of mainly bush type vegetation, which gives way to fairly dense forest along the Maduru Oya river.

Leopard and bear have been seen, while herds of **deer** and **sambar** have moved in. Birdlife of all kinds is plentiful.

There is no accommodation or established campsite available within the park.

Yala East National Park: Yala East is one of the most scenic national parks in Sri Lanka and is situated northeast of Yala.

The vegetation here is semi-arid, with large open areas. During the flowering season the yellow blossoms of the *Crataeva roxburgiana* make the park even more attractive.

The 16-mile (25-km) main track starts at Okanda. It is passable in a jeep in dry weather. Another 30 miles (48 km) of rough jeep track are also available. Along the main track, one comes across some very picturesque lakelets, plains and four saline lagoons. During the migratory season, the lagoons are filled with **ducks**, mostly **pintail** and **garganey**.

Spot-billed pelicans, Gal Oya.

The big game found here are elephants, sometimes in large herds, **leopards** and **bears**, the last found in the more forested areas of the park. Yala East is another place in which to watch out for the **red-faced malkoha** and the **blue magpie**.

The main attraction of the park however is the **Kumana mangrove swamp**. This is the only place in the island with such large concentrations of resident birds gathered for nesting. This is usually around June and July.

Parts of the park are periodically closed – inquire before traveling.

Gal Oya National Park: The mighty Senanayake Samudra reservoir of Sri Lanka is totally encompassed by this national park which was established to conserve its catchment area. Today it has become an elephant stronghold. It lies east of the central hills of the island.

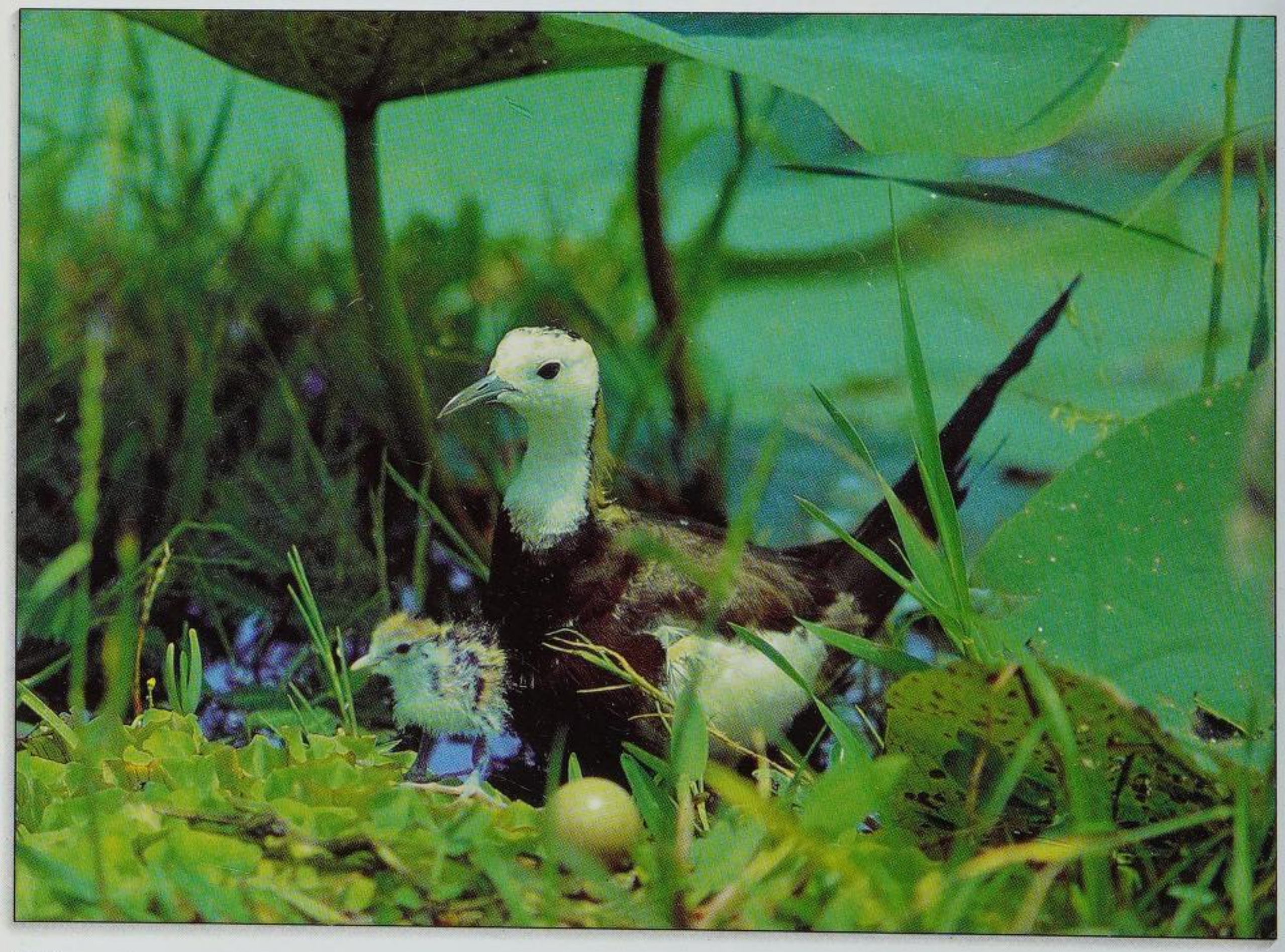
The park has no roads, but boating is available in the reservoir. During the dry season large herds of **elephants** can be seen cooling off and drinking at the water's edge. This could well be the only place where one can see groups of these great creatures swimming across deep water to the numerous islands to feed on the succulent grass growing on them. When the elephants are swimming in deep water, they can be approached, with care, by boat. The park is a good place to get photographs of these animals.

The reservoir is also the home of millions of birds, all aquatic types, and among them are the **cormorants**, **darters**, **pelicans** and a variety of **gulls**. During the nesting season, a boat will be literally surrounded by these flocks, as they swim along with it. Birds of prey too are plentiful. This is the best place to observe the majestic **white-bellied sea eagle** and the **tank eagle**, the island's two largest birds of prey.

About a quarter of the park is dry evergreen forest while the rest is tall grassland savanna. An interesting feature of the vegetation here is the extensive areas of medicinal plants. These were first laid by ancient Sinhala monarchs and have survived to this day.

There is accommodation available both close to and within the park.

Sinharaja Forest Reserve: Though declared a forest reserve and due for total protection on becoming a "National Heritage," Sinharaja has few facilities for visitors. However, excursions may be made into the reserve if there is no military action in the area and travel agents should be able to put you in touch with those who can arrange visits.



Pheasant-tailed jacana.

Sinharaja is a small belt of forest no more than 4 miles (6.5 km) at its wildest and half a mile (800 meters) at its narrowest point. Its total area is only about 21,000 acres (8,500 hectares). Yet what makes Sinharaja unique is that it is the only patch of primeval forest remaining in any significant proportions in Sri Lanka.

The vegetation of Sinharaja is worth looking at. Three-fourths of the total or 125 species of trees there are endemic. An International Union for the Conservation of Nature report states that many of the endemic trees are also dominant components of the canopy, representing an important gene pool found nowhere else in the world.

Though controlled logging, which directly threatened this patch of primeval tropical rainforest some years ago has been stopped, illicit logging still continues to a minor extent.

Sinharaja is also the home of all types of the island's wildlife, small and large, except the elephant, including some unique insect species.

Horton Plains: At an elevation of 7,200 ft (2,200 meters) on the Haputale range in Sri Lanka is a saddle of rolling *patnas* or grassland and stark evergreen montane forest known as the Horton Plains. This is one of the most forbidding yet most stupendously beautiful places on the island.

The main attractions here are the two "world's end," from where one can see the escarpment fall vertically 900 ft (280 meters) from one and a dramatic 2,900 ft (900 meters) from the other.

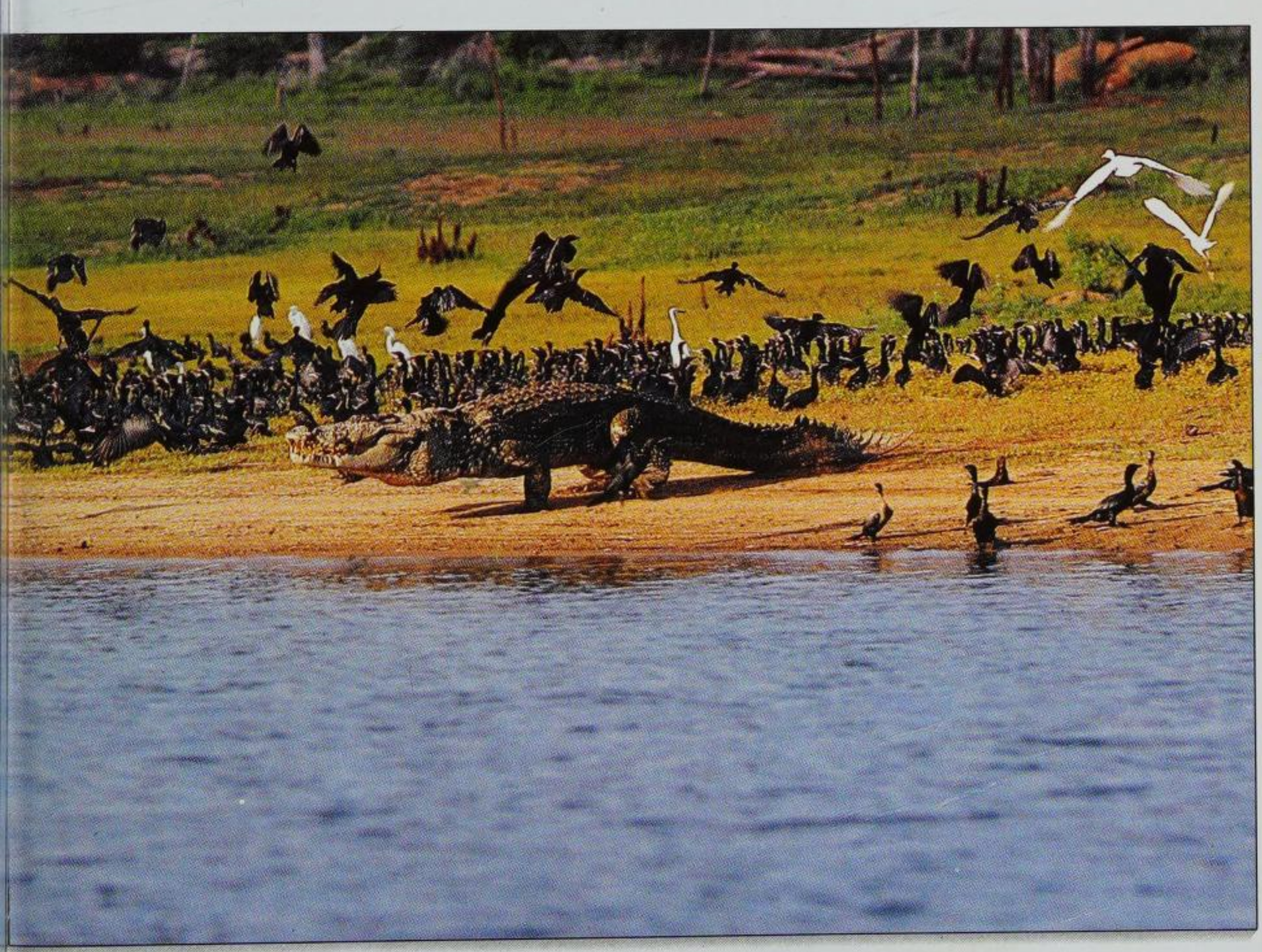
The second- and third-highest peaks in the island, **Kirigalpotha** and **Thotupola**, are also easily accessible from the plains, while two other eye-catchers are **Bakers Falls** and the **Slab-rock Falls**.

Magnificent specimens of leopard are met with, though rarely seen in the open, while **sambar** can be seen daily on the plains. Two types of monkeys are also seen, the **purple-faced leaf monkey** and the **highland torque monkey**, both of which are confined to the hills.

Among the reptiles found here are three unique species – the **nose horned lizard** *(Cerataphora stodarti)*, the *Calotes nigrilabris* and the *Cophotes ceylonica*.

For birdwatchers, the **yellow-eared bulbul**, the **dusky blue flycatcher** and the **Ceylon white eye** are among the endemic birds seen here, amongst a host of other birds that are confined to the hills. The most majestic of them is the powerful **mountain hawk eagle**.

Mugger crocodile with cormorants.



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CONTENTS

Getting Acquainted

The Place.....298
The Land.....298
When to Go.....298
Restricted & Protected Areas.....298
Climate.....299

Planning the Trip

What to Bring.....301
Entry Regulations.....301
Maps.....301
Customs.....302
Getting There.....302
On Arrival.....303
On Departure.....303
Women Travelling Alone.....303
Special Facilities.....303
Gay & Lesbian Travellers.....303
Indian Embassies.....304
Indian Tourist Offices.....304
Wildlife Societies.....304
Websites.....305

Practical Tips

Emergencies.....305
Health.....305
Business Hours.....307
Postal Services.....307
Telecommunications.....307
Poste Restante.....307
Media.....308
Courier Services.....308
Repairs & Tailors.....308
Photography.....308

Getting Around

Travel by Air.....309
Travel by Bus.....309
Rickshaws.....309
Taxis.....310
Travel by Ship.....310
Driving in India.....310
Car & Taxi Rental.....310
Travel by Rail.....310
Reservation Forms.....311

Wildlife Parks

India.....312
Sri Lanka.....337
Nepal.....338

Language

Traveller's Hindi.....340
Traveller's Tamil.....342

Further Reading

General Natural History & Mammals.....343
Birds.....345
Reptiles.....346
Insects.....346
Flowers & Trees.....346
Other Insight Guides.....346
Feedback.....347

Getting Acquainted

The Place

Area India covers an area of 3,287,590 sq. km (1,269,346 sq. miles).
Capital New Delhi.
Largest City Mumbai (with more than 15 million inhabitants).
Highest point Kanchenjunga, in Sikkim (8,586 metres/28,170 ft).
Population 1 billion. The decennial growth rate is 24 percent, a decrease of just over 1 percent since 1971–81. Life expectancy is 58 years for men and 59 for women. There are 929 women for every 1,000 men, a difference which has steadily increased since the beginning of the 20th century.
Major Languages Hindi (mother tongue for more than 360 million speakers), Telugu, Bengali, Marathi and Tamil.
Major Religions Hindu (80 percent); Muslim (11 percent); Christian (2 percent); Sikh (2 percent), Jain, Buddhist.
Time Zones India is 5½ hours ahead of Greenwich Mean Time.
Currency Based on the decimal system with 100 paise to the rupee.
Weights & Measures The metric system is uniformly used all over India. Precious metals, especially gold, are often sold by the traditional *tola*, which is equivalent to 11.5 grams. Gems are weighed in carats (0.2 grams).

Financial outlays and population are usually expressed in *lakhs* (100 thousand) and *crores* (100 *lakhs* or 10 million).
Electricity The voltage system in India is 220V AC, 50 cycles. DC supplies also exist, so check first. Sockets are of the two round-pin variety normally, but do vary. Take a universal adaptor for British, Irish and Australasian plugs. American and Canadian appliances will need a transformer, too, unless multi-voltage.
Dialling Codes To call India from abroad, dial the international access code, followed by 91 for India, the local code less the initial zero, then the number.

The Land

India lies between latitude 8° north and 36° north, and longitude 68° east and 97° east. It is surrounded by the Arabian Sea on the west, the Bay of Bengal on the east and the Indian Ocean to the south. It shares borders with Pakistan, China, Nepal, Bhutan, Burma (Myanmar) and Bangladesh, and is divided into seven major regions: Himalayas, Indo-Gangetic Plain, Central Highlands, Deccan Plateau, Western Ghats, Eastern Ghats and the bordering seas and islands.

When to Go

India's climate ranges from the eternal snows of the Himalayas and the tropical conditions along the coasts, to the continental climate of inland areas. There are also many regional and seasonal variations.

The best time to visit is after the southwest monsoon in the winter months of October to March. On the whole, the weather is beautifully predictable at this time of year, with blue skies and bright sunshine in most areas. Parts of the south and east see a brief spell of rain from the northeast monsoon, while snow and sleet make the extreme north very cold and often inaccessible.

Summer, from April to June, is very hot and dry for most of the country, and humid along the coasts. Kashmir and the hill stations of Himachal and Uttar Pradesh are particularly lovely at this time of the year.

The southwest monsoon begins to set in along the western coast towards the end of May, bringing welcome respite from the heat and varying amounts of rain as it moves across the rest of the country through June and July and withdraws by late September. Northeastern India has heavy rain during this season, making it one of the wettest regions in the world.

Restricted & Protected Areas

Many previously closed areas in the Northeastern states are now open for tourists. The following is a list of places you can visit and routes you can follow in restricted areas. (**NB** the entries for Himalchal Pradesh, Jammu & Kashmir, Rajasthan and Uttar Pradesh only refer to those places you may not visit or need a permit for; the other areas of the states are open.)
Permits are usually obtainable from Indian missions abroad; the Ministry of Home Affairs; Foreign Residents' Registration Offices; home commissioners; district magistrates; and from the chief immigration officers at New Delhi, Mumbai, Kolkata and Chennai airports, for some destinations.

Andaman & Nicobar Islands

Individual tourists may visit the following areas for a maximum of 45 days:
Port Blair, Havelock Islands, Long Islands, Neil Island, Mayabunder, Diglipur, Rangat, entire island of Middle Andaman (excluding reserves), all islands in the Mahatma Gandhi Marine National Park except Boat, Bobday, Twin Islands, Tarmugli, Malay and Pluto (overnight stays on these islands by special permission of the Union Territory Administration), the entire island of South Andaman (excluding reserve), Baratang Islands, North Passage Island, Little Andamans Island (excluding reserve).

The following places may only be visited for the day:
Jolly Buoy, South Cinque, Red Skin, Mount Harriet, Madhuban, Ross Island, Narcondum Island, Interview Island, Brother Island, Sister Island, Barren Island (may only be viewed from a boat).

Climate

		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Agra	Max/Min °C	22/7	26/10	32/16	38/22	42/27	41/29	35/27	33/26	33/25	33/19	29/12	24/8
	Rainfall mm	16	9	11	5	10	60	210	263	151	23	2	4
Ahmadabad	Max/Min °C	29/12	31/15	36/19	40/23	41/26	38/27	33/26	32/25	33/24	36/21	33/16	30/13
	Rainfall mm	4	0	1	2	5	100	316	213	163	13	5	1
Bangalore	Max/Min °C	28/15	31/16	33/19	34/21	33/21	30/20	28/19	29/19	28/19	28/19	27/17	27/15
	Rainfall mm	4	14	6	37	119	65	93	95	129	195	46	16
Bhopal	Max/Min °C	26/10	29/13	34/17	38/21	41/26	37/25	30/23	29/23	30/22	31/18	29/13	26/11
	Rainfall mm	17	5	10	3	11	137	499	308	232	37	15	7
Bhubaneshwar	Max/Min °C	29/16	32/19	35/22	38/26	38/27	35/26	31/25	31/25	31/25	31/23	29/18	28/16
	Rainfall mm	12	25	17	12	61	223	301	336	305	266	51	3
Chandigarh	Max/Min °C	20/7	23/9	29/14	34/19	38/24	39/26	34/24	33/23	33/22	31/17	27/10	22/7
	Rainfall mm	56	25	26	10	13	62	277	263	226	82	5	18
Chennai	Max/Min °C	29/20	31/21	33/23	35/23	38/28	37/28	35/26	35/25	34/25	32/24	29/23	28/21
	Rainfall mm	24	7	15	15	52	53	83	124	118	267	309	139
Darjeeling	Max/Min °C	9/3	11/4	15/8	18/11	19/13	19/15	20/15	20/15	20/15	19/11	15/7	12/4
	Rainfall mm	22	27	52	109	187	522	713	573	419	116	14	5
Delhi	Max/Min °C	21/7	24/10	30/15	36/21	41/27	40/29	35/27	34/26	34/25	35/19	29/12	23/8
	Rainfall mm	25	22	17	7	8	65	211	173	150	31	1	5
Guwahati	Max/Min °C	23/10	27/12	30/16	32/20	31/23	32/25	32/26	32/26	30/25	27/22	25/17	27/12
	Rainfall mm	17	9	73	136	276	351	373	294	190	86	8	7
Hyderabad	Max/Min °C	29/15	31/17	35/20	37/24	39/26	34/24	30/22	29/22	30/22	30/20	29/16	28/13
	Rainfall mm	2	11	13	24	30	107	165	147	163	71	25	5
Jaipur	Max/Min °C	22/8	25/11	31/15	37/21	41/26	39/27	34/26	32/24	33/23	33/18	29/12	24/9
	Rainfall mm	14	8	9	4	10	54	193	239	90	19	3	4
Jaisalmer	Max/Min °C	24/8	28/11	33/17	38/21	42/25	41/27	38/27	36/25	36/25	36/20	31/13	26/9
	Rainfall mm	2	1	3	1	5	7	89	86	14	1	5	2
Kolkata	Max/Min °C	26/12	29/15	34/20	36/24	36/26	34/26	32/26	32/26	32/26	31/24	29/18	27/13
	Rainfall mm	13	22	30	50	135	263	320	318	253	134	29	4
Leh	Max/Min °C	-3/-14	1/-12	6/-6	12/-1	17/3	21/7	25/10	24/10	21/5	14/-1	8/-7	2/-11
	Rainfall mm	12	9	12	7	7	4	16	20	12	7	3	8
Lucknow	Max/Min °C	23/9	26/11	33/16	38/22	41/27	39/28	34/27	33/26	33/23	33/20	29/13	25/9
	Rainfall mm	25	17	9	6	12	94	299	302	182	40	1	6
Mumbai	Max/Mln °C	31/16	32/17	33/20	33/24	33/26	32/26	30/25	29/24	30/24	32/23	33/20	32/18
	Rainfall mm	0	1	0	0	20	647	945	660	309	117	7	1
Nagpur	Max/Min °C	29/13	33/15	36/19	40/24	43/28	38/27	31/24	30/24	31/23	32/20	30/14	29/12
	Rainfall mm	15	2	25	20	10	174	351	277	181	62	9	2
Panaji	Max/Min °C	31/19	32/20	32/23	33/25	33/27	31/25	29/24	29/24	29/24	31/23	33/22	33/21
	Rainfall mm	2	0	4	17	18	580	892	341	277	122	20	37
Patna	Max/Min °C	24/11	26/13	33/19	38/23	39/26	37/27	33/27	32/27	32/26	32/23	29/16	25/12
	Rainfall mm	21	20	7	8	28	139	266	307	243	63	6	2
Pune	Max/Mln °C	31/12	33/13	36/17	38/21	37/23	32/23	28/22	28/21	29/21	32/19	31/15	30/12
	Rainfall mm	2	0	3	18	35	103	187	106	127	92	37	5
Simla	Max/Min °C	9/2	10/3	14/7	19/11	23/15	24/16	21/16	20/15	20/14	18/10	15/7	11/4
	Rainfall mm	65	48	58	38	54	147	415	385	195	45	7	24
Tiruvanantha-	Max/Min °C	31/22	32/23	33/24	32/25	31/25	29/24	29/23	29/22	30/23	30/23	30/23	31/23
puram	Rainfall mm	20	20	43	122	249	331	215	164	123	271	207	73
Varanasi	Max/Mln °C	23/9	37/11	33/17	39/22	41/27	39/28	33/26	32/26	32/25	32/21	29/13	25/9
	Rainfall mm	23	8	14	1	8	102	346	240	261	38	15	2

Arunachal Pradesh

Itanagar, Ziro, Along, Passighat, Daporijo, Mia, Namdapha, Tipi, Sejusa (Puki), Bhalukpong
Passighat–Jengging–Yingkiong
Bhalukpong–Bomdilla–Tawang
Roing–Mayodila–Anini
Tezu–Hayulling

Individual tourists are not allowed. Tourist groups must travel on identified tour circuits only. Maximum period of stay is 10 days.

Himalchal Pradesh

Poo, Khab, Sumdo, Dhankar Tabo Gompa, Kaja, Morang, Dabling

Individual tourists are not allowed.

Jammu & Kashmir

The Drok-Pa Area
Khaltse, Domkhar, Skurbuchan, Hanudo, Biarna, Dah
Nubra Sub-Division
Leh–Khardung La–Khalsar–Tirit–Panamik
Leh–Khardung La–Khalsar–Hundar
Leh–Sabu–Digar La–Digar–Labab–Khungru–Gampa–Tangar (only for trekking with approved tour operators and accompanied by state police personnel).
Nyoma Sub-Division
Leh–Upshi–Chumthang–Mahe–Puga–Tso Moriri Lake/Korzok
Leh–Upshi–Debring–Puga–Tso Moriri Lake/Korzok
Leh–Karu–Chang La–Dubrak–Lukung–Spangmik (Pangong Lake–Spanmik)

Individual tourists are not allowed. Tourist groups must travel on identified tour circuits only. Groups should consist of 4 to 20 members and be accompanied by a liaison officer. Maximum period of stay is 7 days.

Lakhshadweep Islands

Bangaram and Kadmat islands only

Manipur

Loktak Lake, Imphal, Moirang INA Memorial, Keibul Lamjao Deer Sanctuary, Waithak Lake, Khongjom War Memorial
Imphal–Bishnupur–Phubala–Moirang–Sendra
Island–Keibul–Lamjao–Imphal
Imphal–Moirang Lake–Keibul Lamjo–Churchanderpur–Khuga–Imphal
Imphal–Litan–Ukhral–Shiroy–Sangsak–Imphal
Imphal–Thoubal–Waithou Lake–Khngjam–Kakching–Thongjao–Wailkhong–Sugnu–Imphal
Imphal–Khonghampat–Kanglatombi–Kangpokpi–Senapati–Karong–Mao Gate–Imphal
Imphal–Noneh–Khongsang–Nungba–Jiribam–Imphal

Foreigners are permitted to visit these areas for a maximum of 10 days only in a group of four or more. In the case of married couples, the group may consist of two persons.

Mizoram

Vairangre, Thingdawl, Aizawal

Individual tourists are not allowed and groups must travel on identified tour circuits only. Maximum period of stay is 10 days.

Nagaland

No access allowed

Rajasthan

No access allowed to:
the western side (to the India-Pakistan Border) of National Highway 15 from Sri Ganganagar to Sanchore via Sri Ganganagar, Suratgarh, Lunkaransar, Bikaner, Gajner, Kolyat, Phalodi, Khera, Ram Deora, Pokaran, Lathi, Jaisalmer, Sangad, Fatehgarh, Sheo, Bhadewa, Kapoordi, Barmer, Hathitala, Sanwara, Lookhoo, Gandhwa and Dhamuna.
Exceptions:
peripheral areas of cities, towns, and villages on the National Highway; the cities of Suratgarh, Bikaner, Phalodi, Pokaran, Jaisalmer, Barmer and Sanchore; the villages or areas of Amarsagar, Ludarwa, Kuldara, Bada Bagh, Sam and Unda in Jaisalmer District.

Sikkim

Gangtok, Rumtek, Phodong, Pemayangtse, Khechoperi, Tashiding

Individul tourists allowed for a stay of 15 days, which can be extended by the Sikkim Government for a period of 30 days.
Zongri

Permit issued for trekking only (for 15 days), individual tourists not allowed.
Tsangu

Only a day visit is allowed. No individual tourists allowed, tour groups must follow the identified tour circuits.
Mangan, Singhik, Tong, Chunthang, Lachung, Yumthang.

Individual tourists are not allowed. Maximum stay of 5 days.
Gangtok–Penlong–Tinjure–Rumtek/Martem
Gangtok–Chungthang–Lachen–Thangu
Mangan–Lingzia–Shabrung–Talung Monastry–Kisong (except Yabok)
Mangan–Lingzia–Sakyong–Royot Patam (except Gochala)–Dzongri–Yoksum
Yumthang–Phuni–Punichoka–Tarum Chachu–Chungthang
Dikcho–Phodong–Labrang–Namptarn–Mangan–Maling–Singhik–Samartek–Chungthang
Lachung–Yumthang–Yume–Samdong
Sirwani–Tami–Damthang–Tendong–Namchi
Damthang–Tendong–Damthong–Rabangla–Namchi–Yangaang–Singchuthang–Sirwani
Rabangla–Maenam–Borong/Polout–Tashiding
Kewzing–Rayong–Tinkitam–Legship
Yoksum–Dzongri (except Gochala)
Yoksum–Dzongri–Thangsing–Lampokhri
Utterey–Chewa–Bhajang–Dhond–Garakhet–Oktak–Dzongri
Hilley–Sombarey–Versay–Soreng
Hilley–Versay–Dentam
Pelling–Sangcholing–Khecheperi–Yuksom–Dubdi–Sinon–Tashiding

Only organised foreign tourist groups are allowed.

Individual foreign tourists may visit:
Yoksum, Phodong, Singkik, Namchi, Pakyong, Soreng, Mangan (except Chungtang), Barapthing, Rongli, Aritar, Rhenaka, Rorathang, Rangpo
Mountain Biking Routes
Gangtok–Rumtek–Sang–Sirwani–Temi–Damthong–Ravong–Kewzing–Tashiding–Yosum–Gyalzing–Dentam

–Rinchenpong–Soreng–Jorethang–Melli
Gangtok–Phodong–Rangrang–Dikchu–Makha–Sirwani–Temi
Gangtok–Rumtek–Sang–Sirwani–Temi–Namchi–Jorethang–Melli
Gangtok–Rumtek–Sang–Sirwani–Temi–Namchi–Namthang–Rangpo

Only organised foreign tourist groups are allowed for a period of 15 days which may be extended by the Sikkim Government for 30 days.

White Water Routes

Chungthang–Dikchu–Singtam–Melli
Legship–Jorethang–Melli

Only organised foreign tourist groups are allowed for a period of 15, days which may be extended by the Sikkim Government for 30 days.

Uttar Pradesh

Nanda Devi Sanctuary, Niti Ghati and Kalindi Khal in Charnoli and Uttar Kashi Districts, adjoining areas of the Milan Glacier

Individual tourists are not allowed.

Planning the Trip

What to Bring

Clothing

The golden rule of travelling light applies. Travelling in southern India, or the North during summer, is "shirtsleeve weather" and it is best to wear cotton. In the North during winter, sweaters and jackets are required. Cotton shirts, blouses and skirts are inexpensive and easily available throughout the country. Remember to bring underwear (especially bras) and swimwear.

Plan your wardrobe according to your itinerary and the season of your visit. In winter a sweater – preferably two – one light and one heavy, as well as a jacket or an anorak are necessary, especially in the North where daily temperature differentials can be quite wide. Lighter clothing would be adequate in the South and along the coast. Cottons are ideal for summer. Avoid synthetics. Comfortable footwear, trainers for winter and sandals for summer, make walking on uneven surfaces easier.

For their own convenience, women should not wear sleeveless blouses, mini skirts and short, revealing dresses. Cover up – it's a good idea in the Indian sun anyway – locally available *shalwar kamiz* (also known as *churidar*), long tunic tops worn over loose trousers, are ideal.

Other Essentials

If travelling away from the major cities or big hotels, take a sheet, sleeping bag, pillowcases, medical kit including thermometre, padlock, sewing kit and ear-plugs among other items. Sun cream, sun block (vital in the mountains) and insect repellent are not readily available so they should be brought with you, along with cosmetics and tampons. A hat is a sensible item. A basin/bath plug is also useful in smaller hotels, which often do not have them.

Entry Regulations

Tourist visas for all nationalities are issued either for one month from the date of entry, with that entry having to be within a month of issue (this visa is not available by post), or for six months from the date of issue (not entry). It is preferable and safer to take a multiple-entry visa, in order to have the option of visiting a neighbouring country.

The best place to obtain a visa is from the embassy or high commission in your country of residence, rather than risk the complications and delays involved in applying for one in neighbouring countries.

Maps

Obtaining good maps of India can be difficult; the government forbids the sale of detailed maps in border areas, which includes the entire coastline, for security reasons; those which can be bought may not be exported.

Some good maps to bring along are: Bartholomew's 1:4,000,000 map of South Asia; Lascelles map of the same scale and Nelles Verlag maps. Tourist offices can supply larger scale city maps. State and city maps are also published by the TT company, 328 G.S.T. Road, Chromepet, Chennai, Tamil Nadu 600 044, or the Survey of India, Janpath Barracks A, New Delhi 110 001.

Other highly recommended maps are the Eicher series of detailed city maps, along with their guidebook to Delhi, available from local bookstores.

Tourist visas can no longer be extended, you must leave the country and re-enter on a new one. It may be difficult to apply for a new visa from neighbouring countries. Five-year visas are also issued to businessmen and students. Check with the embassy for current details.

If you stay for more than 180 days, before leaving the country you must have a tax clearance certificate. These can be obtained from the foreigner's section of the income tax department in every city. Tax clearance certificates are free, but take bank receipts to demonstrate that you have changed money legally.

In addition to visas, permits are required for certain areas, while other areas are out of bounds to foreigners altogether *(see Restricted & Protected Areas, page 298).*

Customs

Customs procedures have recently been simplified. Visitors fill in declaration forms on the plane, and then proceed to the relevant red or green channels. Tourists seldom have any trouble. Occasionally, customs officials ask to see one suitcase at random and make a quick check.

Prohibited articles

These include certain drugs, live plants, gold and silver bullion, and coins not in current use. Firearms require possession licences (valid for six months) issued by Indian embassies or consulates abroad or, on arrival in India, by a district magistrate. For further details, check with the issuing authority.

All checked luggage arriving at Delhi airport is X-rayed before reaching the baggage collection area in the arrival hall.

Duty-free imports

These include 200 cigarettes (or 50 cigars), 0.95 litres (1 pint) of alcohol, a camera with five rolls of film and a reasonable amount of personal effects, including binoculars, laptop, sound recording instruments, etc.

Professional equipment and high-value articles must be declared or listed on arrival with a written undertaking to re-export them. Both the list and the articles must be produced on departure.

As this formality can be a lengthy process, allow extra time, both on arrival and at departure. For unaccompanied baggage or baggage misplaced by the airline, make sure you get a landing certificate from customs on arrival.

Exports

To avoid last-minute departure problems, remember that the export of antiques (over 100 years old), all animal products, and jewellery valued at over Rs2,000 (in the case of gold) and Rs10,000 (in the case of articles not made of gold) are banned. When in doubt about the age of semi-antiques, contact the office of the Archaeological Survey of India in Delhi, Mumbai, Kolkata, Chennai or Srinagar.

Currency declaration

At present, forms for amounts of cash in excess of US$10,000 must be completed at customs on arrival.

Getting There

By Air

The majority of visitors now arrive in India by air. Mumbai and Delhi airports are the major entry points, with fewer international flights using Kolkata and Chennai from Europe. Kolkata and Chennai especially have flights to and from East Asia.

Other international airports are: Ahmedabad, with flights to and from the UK and the USA as well as the Gulf region; Trivandrum, with flights to and from the Gulf region, the Maldives and Sri Lanka; Hyderabad, with fewer flights to and from the Gulf region; and Dobolin (Goa), with charter flights from Germany, France and the UK.

Agra, Varanasi, Kanpur, Patna, Calicut and Bangalore are airports with limited international air access and customs and immigration facilities, and are not international airports in the real sense of the term. Agra serves charter flights from the UK. Varanasi, Kanpur and Patna have daily flights from Kathmandu in Nepal and there are connecting flights to Delhi. Calicut has flights to and from the Gulf region.

Discounts are often available during the off-peak season, so it is worth making enquiries. Many long-haul flights unfortunately arrive between midnight and 6am, apparently to suit the night landing regulations of European and Far Eastern cities but, in reality, often because of weight restrictions for a full plane taking off in the thin air of an Indian summer.

Once you have bought a ticket, check with the airline to confirm your booking then note down the ticket and flight numbers and computer reference code, and keep them separate from the ticket so, in case of loss or theft, you can obtain a replacement.

The four major airports are constantly improving and all have left-luggage facilities. Porters and licensed taxis are available. Delhi, Mumbai, Kolkata and Chennai all have duty-free shops in both the arrival and departure halls. Airport banks are open 24 hours for currency change.

By Rail

There is a train from Lahore in Pakistan to Amritsar in India which crosses the Wagah-Attari border. It stops for a couple of hours for customs and immigration at the border.

By Road

The border crossing from Pakistan to India is from Wagah to Attari. You used to have to travel to Wagah by public transport, cross the border on foot and take another bus or taxi to the nearest town, there is now a direct bus from Lahore to Delhi. However, if the political situation worsens the service may be shelved, so check before you travel. The border with Nepal is only open for non-Indian or Nepalese nationals at Birganj/Raxhal, Bairwa

and Kakarbitta/Naxalbari.

The old overland route through Turkey, Iran, Afghanistan and Pakistan is little-used by tourists now, but when peace returns to this fascinating area, it might again become popular with the more adventurous traveller. Some companies in the UK and Germany do, however, still operate a few departures. In London, Trailfinders (42–48 Earls Court Road, London W8 6EJ, tel: 020 7937 5400, www.trailfinders.co.uk) can advise.

Women Travelling Alone

Take the normal precautions such as avoiding local public transport, which can become crowded very quickly (crowds are a haven for gropers). "Eve-teasing" is the Indian euphemism for sexual harassment. Do not wear clothes that expose legs, arms and cleavage – *shalwar kamiz* are ideal, and a shawl is handy to use as a cover-all when required.

More serious sexual assaults on tourists are rare and tend to occur in popular tourist areas such as Rajasthan, but in case something should happen, call for help from passers-by.

On the up-side, there are "ladies-only" queues at train and bus stations, and "ladies-only" waiting rooms at stations and compartments on trains.

On Arrival

Once through customs the visitor is often besieged by porters, taxi drivers and others. Choose one porter and stick to him. There is a system of paying porters a fixed amount per piece of baggage before leaving the terminal: a tip of Rs5, once the bags are aboard the taxi or bus, is sufficient. If a travel agent or a friend is meeting you, he or she may be waiting outside the building.

Some major hotels operate courtesy buses, and a public service known as EATS (Ex-Serviceman's Transport Service) operates an airport bus service in Delhi, Mumbai and Kolkata with stops at hotels and major points en route to the city centre.

On Departure

It is essential to reconfirm your reservations for all outward-bound flights 72 hours before departure, especially in the peak season, when most of the flights are overbooked.

Security procedures can be intensive and time-consuming, so allow at least two hours for check-in.

An airport/seaport tax is charged on departure and must be paid prior to check-in (check the cost with your airline at the time of booking). Do ensure that the name of your outward-bound carrier is endorsed on the tax receipt.

For visitors with entry permits, exit endorsements are necessary from the office where they were registered.

Should a stay exceed 180 days, an income tax exemption certificate must be obtained from the Foreign Section of the Income Tax Department in Delhi, Mumbai, Kolkata or Chennai.

Special Facilities

Travelling with Children

Indians love children and are very tolerant and indulgent with them. The problem is that children can be more easily affected by the heat, unsafe drinking water and unfamiliar food seasoned with chillies and spices. In case of diarrhoea, rehydration salts are vital.

Keep the child away from stray animals, especially dogs and monkeys. To avoid the risk of rabies, it may be safer to take an anti-rabies vaccine.

For infants, it is difficult to find nappies and places to change them. Consider bringing a supply of disposables, or changing to washables. A changing mat is essential, as is powdered milk of a brand that your child is familiar with.

For touring, walking and hiking, a child-carrier backpack or a folding pushchair or pram is worth its weight.

Disabled Travellers

Although disability is common in India, there are very few provisions for wheelchairs and special toilets. The roads are full of potholes and kerbs are often high and without ramps. If you have difficulty walking, it may be hard to negotiate street obstacles, beggars, or steep staircases.

On the other hand, Indians will always be willing to help you in and out of buses or cars, or up stairs. Taxis and rickshaws are cheap and the driver, with a little *bakshish*, will probably help.

You could employ a guide who will be prepared to help with obstacles. Another option is to go with a paid companion.

In the UK, the **Holiday Care Service**, 2 Old Bank Chambers, Station Road, Horley, Surrey RH6 9HW, tel: 01293 774535, www.holidaycare.org.uk, could put you in touch with someone.

Some package holiday operators cater for travellers with disabilities, but first ensure that your needs have been fully understood before making a booking. Contact an organisation for the disabled for further information.

Gay & Lesbian Travellers

Homosexuality is still a taboo subject for many Indians. Sexual relations between men are punishable with long prison sentences and cruising in public could come under public disorder laws. There is no similar law against lesbians.

While general attitudes are discriminatory, things are changing slowly, and at least the issue of gay and lesbian rights is starting to be discussed, due in no small part to Deepa Mehta's 1998 film *Fire*,

which depicted an affair between two married women. Attacks on cinemas by the religious right brought counter demonstations onto the streets of major cities.

However, gay and lesbian travellers should be discreet and avoid any public displays of affection (as should heterosexual couples). On the plus side, hotels will think nothing of two men or women sharing a room.

Indian Embassies

Australia: High Commission of India, 3–5 Moonah Place, Yarralumla, Canberra ACT-2600, tel: (06) 273 3774/273 3999; fax: (06) 273 3328/273 1308.
Canada: High Commission of India, 10 Springfield Road, Ottawa, Ontario KLM 1 C9, tel: (613) 744 3751–3; fax: (613) 744 0913.
UK: High Commission of India, India House, Aldwych, London WC2B 4NA, tel: (0891) 880 800 (24-hours recorded visa information); 020 7836 0990 (specific visa enquiries); 020 7836 8484 (general).
US: Embassy of India, 2107 Massachusetts Avenue NW, Washington DC 20008, tel: (202) 939 7000; fax: (202) 939 7027.

Indian Tourist Offices

Australia: Level 2 Piccadilly, 210 Pitt Street, Sydney, New South Wales 2000, tel: (02) 9264 4855; fax: (02) 9264 4860.
Canada: 60 Bloor Street West, Suite 1003, Toronto, Ontario M4 N3 N6, tel: (416) 962 3787–8; fax: (416) 962 6279.
France: 13 Boulevard Haussmann, F-75009 Paris, tel: 01 45 23 30 45; fax: 01 45 23 33 45.
Germany: Baseler Street, 48, D-60329 Frankfurt Am-Main 1, tel: (069) 242 9490; fax: (069) 242 9497.
Italy: Via Albricci 9, 21022 Milano, tel: (02) 804 952/805 3506.
Spain: Avenida Pio XII 30, 28016 Madrid, tel: (091) 345 7339.
UK: 7 Cork Street, London W1X 2AB, tel: 020 8812 0929 (24-hour tourist information); 020 7437 3677 (general); fax: 020 7494 1048.
US: 1270 Avenue of America, Suite 1808, New York 10020, tel: (212) 586 4901–3; fax: (212) 582 3274.

Wildlife Societies

In all countries of South Asia there are private charities, societies and other organisations promoting wildlife conservation and environmental protection. Some are old and revered, such as the Mumbai Natural History Society which celebrated its centenary in 1984; others are new and extremely specialised. Given below is information on some of the most interesting and helpful organisations for travellers.

INDIA

Assam Valley Wildlife Society. A small society with members in Assam, Arunachal Pradesh, Meghalaya and Nagaland. Achieved some success in locating and protecting the white-winged wood duck in the Doom Domma and Dangri Reserve Forests and subsequent captive breeding at Bordubi Tea Estate.

Address: Pertabghur Tea Estate, Post Sootea, Dist. Sonitpur, 784 175, Assam.

The Bombay Natural History Society (BNHS). Despite its name, the BNHS covers the whole of the region. Established in 1883–4 by a group of concerned sportsmen, it has become the foremost organisation of its type in Asia. It collects data and natural history specimens throughout South Asia and Burma. Its museum and library have perhaps the best collections in the continent. Much of its work in recent years has been on bird migration and more recently, a series of studies on certain endangered species and their habitats. It publishes, three times a year, an important journal (since 1886) which is recognised throughout the world as an authoritative source of information on the flora and fauna of South Asia. The society also publishes a popular magazine, *Hornbill*, quarterly, and membership is open to all.

Address: Hornbill House, Opposite Lion Gate, Shahid Bhagat Sing Road, Mumbai 400 023.

Centre for Science and Environment (CSE). Founded by Anil Agarwal in 1981 to study the social and economic impact of science and technology. CSE organises a feature and service for newspapers and publishes a comprehensive report, *The State of India's Environment*, each alternate year.

Address: 807 Vishal Bhawan, Nehru Place, New Delhi 110019.

Chennai Crocodile Bank Trust. Founded by Romulus Whitaker in 1974 to breed and study the three endangered Indian crocodiles, and to study and breed snakes, turtles and other reptiles. It is located 22 miles (35 km) south of Chennai, 9 miles (14 km) before Mahabalipuram.

Address: Vadenemelli Village, Perur PO, Mahabalipuram Road, Chennai 603104.

Nilgiri Wildlife Association. Founded in 1877 to conserve and protect the natural resources, wildlife and habitat of the Nilgiri Hills. The association assists tourists in making bookings in Mudumalai, Bandipur and other nearby parks.

Address: Ootacamund, Tamil Nadu 643001.

Wildlife Association of South India. Founded in 1972 to help enforce game laws and extend reserves. In recent years it has run fishing camps on the Kaveri river each spring in pursuit of the mahseer.

Address: 49 Richmond Road, Bangalore 560025.

Wildlife Preservation Society of India. For over 20 years the society's journal, *Cheetal*, has published articles and papers on many aspects of India's wildlife.

Address: 7 Ashley Hall, Dehra Dun, UP

Worldwide Fund for Nature – India. Started in 1969. Since 1970 it has undertaken a wide variety of projects for the conservation of nature, for youth education and creating public awareness of conservation needs. WWF-I also assists and provides technical support for research projects and study. Publishes a regular newsletter for its members.

Address: **Wordwide Fund for Nature – India,** Pirojsha Godrej National Conservation Centre, 172-B Lodi Estate, New Delhi-110003. A reference library is open to the public 9.30am–1am and 2–5.30pm. It is closed on the 2nd and 4th Saturdays of the month, on Sundays and public holidays. You can log on to www.wwf.org.
They can also be found in:
Bhopal, "Gulnar", Shamla Hills, Bhopal 462013.
Eastern Region, Tata Centre, 43 Chowringhee, Kolkata 700071.
Goa, c/o National Institute of Oceanography, Dona Paula, Goa 403004.
Gujarat, "Sundarvan", Jodhpur Tekra, Ahmedabad 380015; 90 Vidyut Electronics, Nr. Fire Brigade Sadar, Rajkot, 360005 (Baroda).
Hyaderabad, 624/1 Road No. 10, Banjara Hills, Hyderabad 500 034.
Kerala, c/o University of Cochin, Dept. of Fisheries, Fore Shore Road, Cochin 682016.
Nagpur, 54 Bajaj Nagar, Central Bazar Road, (Nagpur 440010, Maharashtra.
Northern Region, 403 Palika Bhawan, Sector XIII, R. K. Puram, New Delhi 110066.
Pune, c/o Vijay Paranjpye,"Durga", 99/2/ Erandawne, Pune 411004.
Southern Region, "Hamsini", 1, 12th Cross Rajmahal Extension, Bangalore 560008.
Tamil Nadu, c/o Dr. C. P. Ramaswami Aiyar Foundation, 1 Eldams, Chennai 600018.

The Worldwide Fund for Nature – India has an important subsidiary organisation managed and run by scientists:
Data Centre for Nature Resources, 18 Spencer Road, Fraser Town, Bangalore 560005.

NEPAL

King Mahendra Trust for Nature Conservation (KMTNC), Jawalakhel, PO Box 3712, Kathmandu.
International Centre for Integrated Mountain Development (ICIMOD), Jawalakhe PO Box 3226, Kathmandu.
International Trust for Nature Conservation (ITNC), c/o Tiger Tops, PO Box 242, Kathmandu.

SRI LANKA

Wildlife and Nature Protection Society of Sri Lanka. Established in May 1894 as the Ceylon Game and Fauna Protection Society, it has published an important journal, *Loris*, since 1936. The society has bungalows in Wilpattu and Yala National Parks. It also has an extensive library.

Address: Chaitiya Road (Marine Drive), Colombo 1.
The Ceylon Bird Club. Founded in 1934, the club organises regular outings and conducts surveys throughout the island. Publishes monthly *Club Notes.*

Address: PO Box 11, Baurs Building, Upper Chattam Street, Colombo 1.

Useful Websites

The following two organisations have websites containing lots of interesting information on Indian wildlife:
Indian Ministry of Environment and Forests:
http://envfor.nic.in
Wildlife Trust of India:
www.wildlifetrustofindia.org

Practical Tips

Emergencies

Generally speaking, India is a safe place to travel, but a tourist is a natural target for thieves and pick-pockets, so take the usual precautions and keep money, credit cards, valuables and passport in a money belt or pouch well secured with a cord around your neck. A protective hand over this in a crowded place could save you a lot of heartache and hassle.

Do not leave belongings unattended, especially on a beach. Invest in good strong locks for all stages of travel. Chaining luggage to the berth on a train, or to your seat on a bus, is another precaution that travelling Indians often take. Watch your luggage carefully, especially during loading and unloading.

Credit card fraud does exist so make sure that shops and restaurants process your card in front of you.

Another sensible precaution is to keep a photocopy of your passport and visa, traveller's cheque numbers and receipts, ticket details, insurance policy number and telephone claims number, and some emergency money in a bag or case separate from your other cash and documents. If you are robbed, report the incident immediately to a police station (be patient, this can take hours).

Health

No inoculations are legally required to enter India, but it is strongly advised that you get inoculations against typhoid (Typhim Vi gives protection for 3 years), hepatitis A

(Havrix gives immunity for 1 year, up to 10 years if a 6-month booster is given), polio (a booster is needed every 5 years) and tetanus (booster injection every 10 years). Other diseases against which vaccinations might be considered, particularly for longer trips, include meningitis, rabies and Japanese B encephalitis.

Malaria prophylaxis is essential for all areas except those above 2,500m. The usual anti-malarial protection consists of a combination of daily proguanil (Paludrine) and weekly chloroquine (Avoclar, Nivaquin). These are now bought across the counter in the UK, but consult your doctor for the correct dosages. An alternative drug is mefloquine (Larium), taken weekly. However, its strong side effects mean it is rarely prescribed and then only for short periods. The best, and only certain, protection against malaria is not to get bitten. Sleep under a mosquito net whenever possible, cover up in the evenings and use an effective insect repellent such as DEET (diethyltoluamide). Burning mosquito coils, which are easily obtainable in India, is also a good idea.

Bring along a personal medical kit to take care of minor ailments. This should include anti-diarrhoea medication, a broad spectrum antibiotic, aspirin, a thermometre, clean needles and something for throat infections and allergies would be a good idea. Take your regular medications, tampons and panty-liners, contraceptives and condoms, as these may be difficult to find.

Also include plasters, antiseptic cream and water purification tablets. All cuts, however minor, should be cleaned and sterilised as immediately to prevent infection. Locally available oral rehydration powders (such as Vijay Electrolyte) containing salts and dextrose are an ideal additive to water, especially when travelling in the summer months or when suffering from diarrhoea. If oral rehydration salts are not available then one teaspoon each of salt and sugar in 500 ml of water is a useful substitute.

Prickly heat is a common complaint caused by excessive perspiration. Try to keep the skin dry by using talcum powder and wearing loose-fitting cotton clothes. Fungal infections are also common and can be treated by exposure to the sun and/or by the application of Caneston cream.

● **Traveller's diarrhoea** is usually caused by low-level food poisoning and can be avoided with a little care. When you arrive, rest on your first day and only eat simple food; well-cooked vegetarian dishes, a south Indian *thali* and peeled fruits are perhaps best. An upset stomach is often caused by eating too many rich Indian meat dishes (often cooked with vast amounts of oil and spices) and failing to rest and let your body acclimatise.

Drink plenty of fluids but never drink unboiled or unfiltered water. When in doubt, stick to soda, mineral water, or aerated drinks of standard brands. Avoid ice as this is often made with unboiled water. All food should be cooked and eaten hot. Don't eat salads and always peel fruit.

With all cases of diarrhoea, including dysentery and giardia described below, it is not a good idea to use imobilising drugs such as loperamide (Imodium) and atropine (Lomotil) as they prevent the body ridding itself of infection. These should only be used if you have to travel. The most important thing to do in cases of diarrhoea and/or vomiting is to rehydrate, preferably using oral rehydration salts.

● **Dysentery and giardia** are more serious forms of stomach infection and should be suspected and treated if the diarrhoea lasts for more than 2 days.

Dysentery is characterised by diarrhoea accompanied by the presence of mucus and blood in faeces. Other symptoms include severe stomach cramps and vomiting. Bacillic dysentery comes on quickly and is usually accompanied by fever. It may clear up by itself but its usual treatment is with 500mg of ciprofloxacin or tetracycline twice daily for 5 days. Amoebic dysentery has a slower onset and will not clear up on its own. If you suspect you have amoebic dysentery you should seek medical help as it can damage the gut. If this is not available then self-treat with 400mg of metronidazole (Flagyl) three times daily with food for 7 days. You must not drink alchohol when taking metronidazole.

Giardia is a similar infection caused by a parasite. Like amoebic dysentery it comes on slowly and its symptoms include very loose and foul-smelling diarrhoea, feeling bloated and nauseous, and stomach cramps. Giardia will not clear up on its own and will recur; its treatment is the same as for amoebic dysentery.

● **Altitude sickness** can occur above 2,500 metres. Watch for symptoms of breathlessness, palpitations, headache, insomnia, or loss of appetite. With total rest, travellers usually acclimatise within 48 hours.

Inhaling a few breaths from an oxygen cannister can provide immediate relief in a mild attack. A severe attack, brought on by climbing too high or quickly, or by flying in unpressurised aircraft, is marked by dizziness, nausea, vomiting, convulsions, severe thirst, drowsiness, blurred vision, weakness, or hearing difficulties.

The best treatment is to descend to a lower altitude at once. Lung damage from lack of oxygen can be permanent if untreated. Allow several days to acclimatise before attempting to reascend in easy stages.

A previous trip with no symptoms does not mean that a traveller is immune to altitude sickness. It can strike anyone and being fit does not prevent the problem.

● **Heat exhaustion** is common, and indicated by shallow breathing, a rapid pulse, or pallor, and is often accompanied by leg cramps, headache or nausea.

The body temperature remains

normal. Lying down in a cool place and sipping water mixed with rehydration salts or plain table salt will prevent loss of consciousness.

● **Heatstroke** is more serious, and more likely to occur when it is both hot and humid. Babies and elderly people are especially susceptible. The body temperature soars suddenly and the skin feels dry. The victim may feel confused, then pass out.

Take them quickly to a cool room, remove their clothes and cover them with a wet sheet or towels soaked in cold water. Call for medical help and fan them constantly until their body temperature drops to 38°C (100°F).

Business Hours

Government offices

Officially 9.30am–6pm Monday to Friday, but most business is done between 10am and 5pm with a long lunch break.

Post Offices

Open from 10am–4.30pm Monday to Friday, and until 12 noon on Saturday. However, in most of the larger cities, the Central Post Office is open until 6.30pm on weekdays, 4.30pm on Saturday. On Sunday some open until noon. Major telegraph offices are open 24 hours.

Shops

Open from 10am–7pm. Some shops close for lunch. Although Sunday is an official holiday, different localities in major cities have staggered days off so that there are always some shopping areas open.

Restaurants

Usually open until 11pm. Some nightclubs and discoteques close very much later. Hotel coffee shops are often open around the clock.

Banks

Open from 10am–2pm weekdays, 10am–noon Saturday for most foreign banks and nationalised Indian banks (of which the State Bank is the largest). Some banks operate evening branches, while others remain open on Sunday and close on another day of the week, and some open 9am–1pm. ANZ Grindlays has two branches open 24 hours; one in Connaught Place, New Delhi, the other at Breach Candy, Mumbai. All banks are closed on national holidays, on 30 June and 31 December. Most businesses close on public holidays.

Postal Services

The internal mail service is efficient in most areas. It is advisable to personally affix stamps to letters or postcards and hand them over to the post office counter for immediate franking rather than to post them in a letterbox.

Sending a registered parcel overseas is a complicated and time-consuming process. Most parcels should be stitched into cheap cotton cloth and then sealed (there are people outside major post offices offering this service). Two customs forms need to be completed. Once the parcel has been weighed and stamps affixed, make sure it is franked and a receipt of registration is issued. Important or valuable material should be registered.

Many shops offer to dispatch goods, but not all of them are reliable. It is usually only safe when handled by a government-run emporium.

Airfreighting purchases is possible but can be equally time-consuming. You will need to produce the bill and receipt, encashment certificate, your passport and onward airline ticket. There are many airfreight agents throughout India and most travel agents can provide assistance.

Telecommunications

India's telephone system is steadily improving and international calls can now be dialled direct to most parts of the world or booked through the operator. Calling from hotels can be extremely expensive, with surcharges up to 300 percent,

Poste Restante

Generally this works well, but make sure your name is clearly written. Most towns have only one main post office but there is often confusion between Delhi and New Delhi. New Delhi's main post office is near Connaught Circus while Delhi's main post office is between the Red Fort and Kashmir Gate in "Old" Delhi.

so check rates first. Mobile telephones have also made an appearance in India and may be rented for the duration of your stay.

Privately run telephone services with international direct-dialling facilities are very widespread. Advertising themselves with the acronyms STD/ISD (standard trunk dialling/international subscriber dialling), they are quick and easy to use. Some stay open 24 hours a day. Both national and international calls are dialled direct. To call abroad, dial the international access code (00), the code for the country you want (44 for the UK, 1 for the US or Canada), the appropriate area code (without any initial zeros), and the number you want. Some booths have an electronic screen that keeps time and calculates cost during the call. Prices are similar to those at official telecommunications centres.

Home country direct services are now available from any telephone to the UK, US, Canada, Australia, New Zealand and a number of other countries. These allow you to make a reverse-charges or telephone credit card call to that country via the operator there. If you cannot find a telephone with home country direct buttons, you can use any phone toll-free by dialling 000, your country code and 17 (except Canada, which is 000-167).

Many privately run telephone services have fax machines and most large hotels have a fax.

E-mail and the internet are now very popular and widely available. All large cities, and many smaller places, have internet cafés or similar

places where you can surf the net or send e-mails. Charges are generally by the minute or hour, and are usually around 60 Rs per hour.

Media

Newspapers & Magazines

With a large number of English-language dailies and hundreds of newspapers in Indian languages, the press in India provides a wide and critical coverage of national and international events.

Among the better-known national English language dailies are the *Times of India*, *The Indian Express*, *The Hindu* and *The Hindustan Times* (all available on-line). There are also two Sunday papers, *The Sunday Observer* and *The Sunday Mail*. The main newspapers in Delhi are the *Asian Age* and *Pioneer*.

The top news magazines include *India Today*, *Outlook* and *Frontline* (also on-line). There are also excellent general-interest magazines such as *Sanctuary* (specialising in South Asian natural history) and *The India Magazine*. Travel magazines like *Travel Links* and city magazines such as *Delhi Diary* and *Hallo! Chennai* give current information on internal travel and local cultural events.

International newspapers are available in Mumbai and Delhi within 24 hours and some international magazines are also available.

There are several glossy magazines in English, including *Society*, *Mumbai* and *First City*, and women's magazines such as *Femina*. Indian editions of *Cosmopolitan* and *Elle* magazines are for sale.

Television & Radio Stations

Doordarshan is the government television company and broadcasts programmes in English, Hindi and regional languages. Local timings vary, but generally the news in English can be heard daily at 7.50am and 9.30pm.

Satellite television is available almost everywhere, including Star TV's five-channel network incorporating the BBC World Service and MTV. Other stations include VTV (local youth-orientated music channel) and Zee TV (Hindi). There are channels showing sport, American soaps and sitcoms and English-language movies. Up to 30 channels can be picked up, given the right equipment.

All India Radio (AIR) broadcasts on the short-wave, medium-wave and in Delhi, Mumbai and Chennai on FM (VHF). The frequencies vary, so check with your hotel.

Courier Services

Most of the major international courier networks have agency agreements with Indian companies. DHL, Skypak and IML all work under their own brand names while Federal Express operates as Blue Dart. These companies have offices in the major towns and operate both international and extensive domestic networks.

Note: The government's Speedpost service delivers quickly at a similar price.

Repairs and Tailors

Traditionally, India's use of resources is very efficient, reflected in the way almost everything can be recycled and/or repaired. Since travelling around India can be hard on your shoes, baggage and clothes, this is very useful. Chappal-wallahs, shoe repairers, can be found everywhere, usually sitting by the side of the road with their tools in a wooden box. For an embarassingly small charge, they will be able to glue, nail or stitch almost any pair of shoes or sandals back into shape. (A somewhat more inconvenient service is offered by the shoeshine boys around Connaught Place in New Delhi. They can throw a dollop of muck onto your shoe without you noticing, and will then offer to clean it off for an exorbitant fee.)

Indian tailors are very skillful and can run up a set of clothes quickly. Although they can do fair copies of Western fashions, they are, obviously, much better at stitching *sari* blouses or *shalwar kamiz*. The process of buying fabric is one of the great pleasures of visiting India, and if you want it made up, most shops will be able to recommend a good tailor.

Tailors will also be able to repair your existing clothes, even badly torn ones, and – just as useful – can stitch up rucksacks which are on the point of collapse.

Photography

Any recommendations with regard to equipment given by one professional is liable to be disputed by another. There are, though, certain pieces of advise that can be given without fear of contradiction.

Considerable skill is required to photograph insects, flowers and trees in their natural environment and lengthy preparation is often required. Animals, on the other hand, are perhaps surprisingly easier to photography. Most travellers use one of the many makes of 35 mm SLR cameras, each of which has a facility to change lenses. Unless otherwise stated, all comments refer to this type of equipment.

Unlike the Galapagos islands or Antarctica, nowhere in South Asia are standard lenses adequate for photographing wild animals. Telephoto lenses from 180 mm upward are required for most animal photographs, 35 mm or 28 mm wideangle lenses are extremely useful for striking scenic or environmental pictures. Also, a tripod or monopod is extremely useful, especially when using telephoto lenses.

There are few places in South Asia where prompt and reliable camera servicing can be had, so equipment should be checked before arriving in India. If your equipment is new, it is advisable to shoot a test roll before leaving home to ensure you are familiar with the equipment and that everything is working as expected.

Carrying an extra body not only gives flexibility in using alternative lenses or film types, but also acts

as a back-up in case of mechanical or electrical failure.

Film

Film is generally not easily available and when found, may not be of the type you are used to. Carry more film that you think you'll need. Surplus film can be used as presents and is always greatly appreciated.

Having to use telephoto lenses and the poor light conditions of the jungle often mean that excellent high-resolution film such as Kodachrome 25 or 64 is not fast enough. Higher speed Ektachrome or Fujichrome lack a certain quality but do give flexibility in poor light. The same applies to print or negative film.

Colour print film, developing and printing facilities are available in all big cities. Colour slide film can only be found in major cities and it may be safer to bring your own.

Protect your camera and film from excessive exposure to heat, dust and humidity. Do not leave them in direct sun or in a locked car (which can get incredibly hot) as heat affects film.

Carry film by hand in a plastic bag which can be given to airport security officers for inspection rather than being put through X-ray machines. There are strict restrictions on photography of military installations, bridges and dams, airports, border areas and Adivasi/restricted areas.

Getting Around

Travel by Air

Indian Airlines (not to be confused with the international carrier, Air India), has one of the world's largest domestic networks. The reservations system has been improved by the introduction of computers. For travel during the peak season (September–March), try and make reservations in advance as flights are usually heavily booked.

With time-consuming check-in and security procedures, you must be at the airport an hour before departure time. Coach services from some city terminals are available. In-flight service is adequate. Alcohol is only available on international flights.

Indian Airlines has a good safety record. Its fares are often lower than those charged for comparable distances elsewhere. The baggage allowance per adult is 20kg and 30kg in business class.

Cancellation charges on tickets purchased locally are extremely high, but none are applicable for domestic sectors issued on international tickets.

The Discover India fare valid for 21 days of travel all over the country and the Tour India Scheme valid for 14 days and limited to six flight coupons are both particulary attractive. These tickets must be purchased abroad, or paid for in India using foreign currency. For details, contact your travel agent or an Air India office abroad, or write to: Traffic Manager, Indian Airlines House, Parliament Street, New Delhi.

Air India carries domestic passengers on its linking flights between Mumbai and Delhi, Kolkata, Chennai and Bangalore. These flights leave from the international terminals in the respective cities.

The privately operated airlines Jet Airways and Sahara Indian Airlines fly certain domestic routes.

Travel by Bus

Almost every part of the country is connected by an extensive and well developed bus system with the railway stations being the natural hubs for both local and regional services. Some of the more rural routes are serviced by noisy dilapidated vehicles, but an increasing number of deluxe and air-conditioned expresses ply the trunk routes.

Many of the trunk routes are now operated by video coaches – if you have never been to an Indian cinema, a night bus journey is an introduction to the popular variety of Hindi or regional film.

There are many parts of the country where the bus service is the only means of public transport – the Himalayas in particular – and at times may be more convenient (for instance, between Agra and Jaipur).

On many routes, even local ones, reservations can be made. Most baggage is carried on the bus roof, so all bags should be locked and checked on at intermediate stops. Most cities have a bus service; Mumbai's bus service is excellent whereas Delhi's is inadequate and crowded.

In cities it is preferable to use taxis or three-wheeled "auto-rickshaws".

Rickshaws

The most convenient way of getting around town is by rickshaw. These come in three types, a cycle rickshaw (a tricycle with a seat for two people on the back), an "auto" (a motorised three-wheeler) and, only in central Kolkata, rickshaws pulled by men on foot.

Autos are, like taxis, supposed to use a meter. You should insist on

Taxis

When taking a taxi or bus into town from the airport, it is advisable to change money in the arrival hall. In Delhi, Mumbai and Bangalore, a system of prepayment for taxis into the city is operated by the traffic police. This saves considerable anguish when the occasional unscrupulous driver takes a long route or tries to overcharge. Elsewhere, enquire at the information desk for the going rate for a journey to your destination before getting into the taxi; and make sure the meter is "down" before you embark. It is alright to share a taxi even if the destination may not be the same (although in the same area). In some cities, taxis have fare charts which, when applied to the amount on the meter, give the correct fare. There is often a night surcharge of 10 percent between 11pm and 6am and a rate of Rs1 to Rs2 per piece of baggage.

this and get out if they refuse. Meter rates are subject to periodic changes, and extras for late-night journeys etc., which the driver should show you on a card. In popular tourist spots, during rush hour and bad weather, you may find it impossible to persuade the drivers to use the meter. A tactic that might work is to offer "meter plus five" (the cost plus Rs5). If not, you'll have to negotiate the fare. After a short while in the country you will get a feel for what is acceptable, given that as a relatively well-off foreign tourist you are expected, quite reasonably, to pay a little more.

Cycle rickshaws are more convenient in some places, like the very congested streets of Old Delhi. With these you should negotiate the fare before you set off.

Travel by Ship

Apart from the river ferries there are very few boat services in India. The Andaman Islands are connected to Kolkata, Chennai and Vishakapatnam by boat, as well as to each other. There are luxury services between Kochi and Lakshadweep. Kerala has a regular passenger boat system and a number of services operate from Alappuzha and Kollam (formerly Alleppey and Quilon), including the popular backwater trip between the two.

Driving in India

The best advice to anyone who is thinking about driving in India is don't. Roads can be very congested and dangerous and there are many unwritten rules followed by other drivers. It is far better, and cheaper, to hire a taxi and driver.

However, if you do have to drive you will need your domestic licence, liability insurance, an international driver's permit and your vehicle's registration papers. Information regarding road conditions can be obtained from national and state automobile associations which periodically issue regional motoring maps, general information regarding roads and detailed route charts.

Contact: the **Automobile Association of Upper India** Lilaram Building, 14-F Connaught Circus, New Delhi 110001, tel: 331 4071, 331 2323–5; **Western India Automobile Association** Lalji Narainji Memorial Building, 76 Veer Nariman Road, Mumbai 400 020, tel: 291 085/291 192; **Automobile Association of Eastern India** 13 Promothosh Barna Sarani, Kolkata 700 019, tel: 474 804; **Automobile Association of Southern India** 187 Anna Salai, Chennai 600 006, tel: 86121–3; and the **UP Automobile Association** 32-A Mahatma Gandhi Marg, Allahabad, tel: 2445.

Car & Taxi Rental

Chauffeur-driven cars, costing about US$20 a day, can be arranged through tourist offices, hotels, local car rental firms, or branches of Hertz, Budget or Europcar.

The big international chains are best for self-drive car rental. They charge 30 percent less than for chauffeur-driven cars with about a Rs1,000 deposit against damage if paid in India, more if paid in country of residence. In some places motorbikes or mopeds are available for hire.

Taxis can be air-conditioned or non-air-conditioned. Charges vary, ranging from Rs325 for eight hours and 80 km (50 miles) to Rs450 for an air-conditioned car. For out-of-town travel, there is a per km charge, usually between Rs2.30–Rs3 per km in the plains (in the hills this rate is often Rs6 per km), with an overnight charge of Rs100. Package tours, sold by travel agencies and hotels, include assistance, guides and hotel accommodation, in addition to taxi charges.

The local yellow-top black taxis are metered, but with constant hikes in fuel prices, charges may often be higher than indicated on the meter. If so, this will be prominently stated in the taxi and the driver will have a card showing the excess over the meter reading that can be legitimately charged.

The fare for three-wheelers is about half that of taxis. Do not forget to ensure that the meter in the three-wheeler is flagged down to the minimum fare.

Travel by Rail

Rail travel is safe, comfortable and by far the best way to get around the country.

Indian Railways has a number of different classes, of varying degrees of comfort. In descending order of price, they are:

- First class AC, very comfortable with lockable cabins of four berths each.
- AC II tier, partitions arranged in groups of 6 berths with curtains that pull across to provide privacy.
- AC III tier, partitions with groups of 9 berths, the middle berths fold down for sleeping.

- AC chair car.
- First class, non-AC but with ceiling fans. Has lockable cabins of four berths each. There is one cabin of two berths halfway down each carriage.
- Sleeper class, partitions of 9 berths with ceiling fans.
- Second class, unreserved with no berths and hard seats.

Reservations are required for all classes other than second class. In the summer months it is best to go AC. When the weather is cooler then first class can be an excellent option as it is possible to see the passing countryside without staring through the darkened windows of AC.

All carriages have both Western and Indian-style toilets. If you are up to squatting on a moving train always use the Indian toilet as they are invariably cleaner and better maintained.

Advance reservation is strongly recommended. Over 400 stations now have very efficient computerised booking counters from where you can book any ticket for any route. Reservations may be made up to 60 days in advance and cancellations (for which you will need to fill in the same form as for a reservation) can be made with varying degrees of penalty depending on the class and how close the cancellation is made to the time of departure. In the larger cities, the major stations have tourist sections with English-speaking staff to reduce the queues for foreigners and non-resident Indians buying tickets; payment is in pounds sterling or US dollars (traveller's cheques or cash). If reservations are not available then certain trains have a tourist quota that may be available. Other options are to take a waitlisted ticket or the more assured reservation against cancellation (RAC); the booking clerk should be able to advise you on how likely you are to get a reservation. It is also possible to make bookings from abroad through Indian Railways representatives. They will accept bookings up to six months ahead, with a minimum of one month for first class, three months for second.

Trains are slow compared to those in the West, so if you are in a hurry, stick to the expresses. Fares are generally low. The Indrail Pass, available to foreign nationals and Indians resident abroad and paid for in foreign currency, can cut down on time getting reservations and be good value if you plan on travelling nearly every day (it is not valid for the Palace on Wheels, Royal Orient and Fairy Queen). In the UK the pass can be obtained through S.D. Enterprises, 103 Wembley Park Drive, Wembley, Middlesex HA9 8HG, tel: 020 8903 3411; fax: 020 8903 0392. They can also book single-journey tickets in advance for you. The Indrail pass can be bought in India at Railway Central Reservations Offices in Chennai (tel [advance]: 564 455/563 545; [current]: 567 585/566 565); Kolkata (tel: 280 370–4/202 025); Mumbai Central (tel: 292 122/222 126/292 042/291 952); Mumbai CST (tel: 415 0079); and New Delhi (tel: 344 877/345 080/345 181).

Tourist Guide Offices at railway reservation centres are helpful in planning itineraries and obtaining reservations. Tourist Guides are available at New Delhi, tel: 352 164; Mumbai, Churchgate, tel: 298 016 4577; Kolkata, Fairlie Place, tel: 202 789; Chennai Central, tel: 563 816. Railway timetables available at Indian Tourist Offices abroad also contain much useful information.

Each regional railway prints its full timetable in Hindi, English and the regional language. There is also the monthly *Indian Bradshaw*, which lists all services across the country, or the concise but comprehensive *Trains At A Glance*, probably the most useful timetable for foreign tourists. These publications should be available from railway stations but they are updated and reprinted regularly so are periodically unavailable.

Remember to check which station your train departs from and do allow at least an hour to find your seat/berth. Lists of passengers with the compartment and seat/berth numbers allotted to them are displayed on platforms and on each carriage an hour before departure. The station superintendent and the conductor attached to the train are usually available for assistance.

Food can usually be ordered through the coach attendant and, on Shatabdi and Rajdhani trains, the fare covers food, drinks and snacks as well. Bedding consisting of two sheets, a pillow and a blanket is provided in first class AC, AC II tier and III tier, and is also available from the

Reservation Forms

To buy your ticket you must first fill out a Reservation Requisition Form, which will be available from one of the windows in the booking office. The form is in the local language on one side and English on the reverse. In addition to the obvious information such as where you wish to leave from and go to and when, to fill in the form you also need to know:

- The train number and name. You can get this from a timetable, or, if the train departs from the station you are booking from, it is usually displayed on a board in the booking office.
- The class you wish to travel and whether you require a berth (for overnight journeys, or any journey between 9pm and 6am), or only a seat.
- Whether you require a lower, middle or upper berth. An upper berth is a good idea as it can be used throughout the day, whereas the other two may only be used for sleeping 9pm–6am.

Foreign travellers should also fill in their passport numbers in the column that asks for your Concession Travel Authority Number, which is needed if the ticket is issued under the foreign tourist quota.

attendant for Rps20 in first class. In theory, if they want bedding, first class passengers should contact the Station Manager before travelling, but extra bedding is often available. If travelling sleeper class then it is a good idea to take a sheet sleeping bag (any Indian tailor will run one up for you).

Retiring rooms (for short-term occupation only) are available at over 1,100 stations on a first-come first-served basis, but demand usually exceeds supply. All first class waiting rooms have couches for passengers using their own bedding. At both New Delhi and Howrah stations, a Rail Yatri Niwas has been built for transit passengers. Rooms can be booked in advance.

Cloakrooms are available at most stations where travellers can leave their luggage, but bags must be iocked, and don't lose the reclaim ticket. Check opening times of the cloakroom for collection.

Pre-paid taxi and/or auto-rickshaw services are available at some stations.

Wildlife Parks

India

Much of India's wilderness now falls within areas giving legal protection to the many species and the flora within them. Some of these protected areas are small, obscure and extremely difficult to reach. Many have little or no facilities and are in no way capable of catering for visitors. Others have a variety of accommodation ranging from forest bungalows, rest houses and Public Works Department (PWD) bungalows to deluxe tented camps and lodges. The list that follows is as comprehensive as possible within the limits of this volume. Basic information, such as location, status, access and accommodation, is given along with an indication of the major mammal, birds, reptiles, and flora that are to be found.

Even when a rest house is available, the facilities may be limited. In many areas there is only a building with basic furniture – visitors must bring their own food and bedding. A contact address is given wherever possible and bookings can be made by post. Some parks have a wider range of facilities provided by State Tourism Corporations, the Indian Tourism Development Corporation (ITDC) and private companies. Bookings for these can be made through most travel agencies.

All areas are listed alphabetically within an alphabetical listing of states and union territories.

There are some 70 national parks and over 400 sanctuaries in India constituted under the Wildlife (Protection) Act of 1972 covering a total of approximately 35,000 sq miles (90,000 sq km). This is about 3 percent of the total land area of India compared to almost 12 percent in Sri Lanka. Around a further 200 areas have been proposed for protection.

At the last census in 1991, the status of national parks and sanctuaries in India was as follows: (The first figure is the number of national parks and figures within brackets indicate sanctuaries. For example, Rajasthan has 4 national parks and 23 sanctuaries.)

Andaman and Nicobar Islands; 6 (21)
Andhra Pradesh; 1 (19)
Arunachal Pradesh; 1 (7)
Assam; 2 (8)
Bihar; 2 (19)
Chandigarh; (1)
Delhi; (1)
Goa, Daman & Diu; 1 (4)
Gujarat; 4 (18)
Haryana; 1 (6)
Himachal Pradesh; 2 (29)
Jammu & Kashmir; 4 (11)
Karnataka; 5 (19)
Kerala; 3 (12)
Maharashtra; 5 (25)
Madhya Pradesh; 11 (34)
Manipur; 2
Meghalaya; 2 (3)
Mizoram; (2)
Nagaland; (4)
Orissa; 1 (17)
Punjab; (5)
Rajasthan; 4 (23)
Sikkim; 1 (4)
Tamil Nadu; 4 (11)
Tripura; (4)
Uttar Pradesh; 6 (29)
West Bengal; 2 (16)

ANDAMAN AND NICOBAR ISLANDS

These islands lying in the Bay of Bengal were once a hill range stretching from Sumatra (Indonesia), 75 miles (120 km) to the south, to Burma. Many of the islands are still covered with rich tropical evergreen and tropical moist deciduous forests and are home to many endemic birds and reptiles. Most of the mammals are

introduced species. Not only is the bird and forest life fascinating, but many islands are refuges for ancient and highly threatened Adivasi peoples struggling to maintain their traditions and identity despite the pressure from the 21st century. Although the first outside permanent settlement was established by Lieutenant Archibald Blair in 1789, the islands had been recorded in the 9th century by Arab merchants sailing to Sumatra. For a short time prior to Blair's survey the Danes had a settlement in the Nicobars.

The temperatures of the islands ranges from 68–86˚F (20–30˚C) with the rainy season from June to December.

By early 1989 there were 100 protected areas in the territory of which many are separate islands. Not only is permission to visit many of them difficult to obtain but getting to them a complicated exercise. Unlike many parks and sanctuaries most of these areas have not been established for mammals but rather plants, birds and marine life. Most mammals are rodents and bats although introduced species include the Andaman pig, chital, hog deer, elephant and palm civet. Of the indigenous mammals the crab-eating or Nicobar macaque, the Nicobar tree shrew and the dugong are significant. Of the 255 bird species 112 are endemic to the islands and many are highly endangered.

Barren Island Sanctuary

Established: 1977.
Location: Barren Island is located approximately 38 miles (60 km) east of the main Andaman group of islands. It is about 78 miles (125 km) north- east of Port Blair.
Size: This island sanctuary is only 3.1 sq miles (8.1 sq km) and consists of some closed forest cover around an isolated volcano.
Best time to visit: January to March.
Animals and birds of the park: The waters around the island are home to dolphins and dugongs.

Marine National Park

Established: 1983. Formally known as Crocodile National Park.
Location: This National Park is situated about 19 miles (30 km) west of Port Blair.
Best time to visit: January to March.
Animals and birds of the park: This sanctuary is home to an important range of marine reptiles including green sea, leather backed, olive ridley and hawks bill turtles and salt water crocodiles. Bird life includes white-bellied sea eagle, Andaman wood pigeon and Andaman teal *(Anas gibberifons).*

Middle Button Island National Park (North & South)

Established: 1979 (the southern park was established in 1977)
Location: These three national parks are situated along the west coast of the Andaman Islands.
Best time to visit: January to March.
Animals & birds of the park: These small island parks have few land mammals. The dolphin and dugong are often sighted near the coast; the water monitor lizard is also found.

Mount Harriet National Park

Established: 1979.
Location: About 10 miles (15 km) south of Port Blair. Largely hill and ridge evergreen forest with accessible valley and flat land forest that has been exploited in the past.
Size: 18 sq miles/47 sq km.
Best time to visit: January and February.
Animals & birds of the park: This island is prime habitat for the Andaman wild pig.

Narcondum Island Sanctuary

Established: 1977.
Location: This island sanctuary is located about 160 miles (260 km) north-east of Port Blair.
Best time to visit: November to April.
Animals & birds of the park: This sanctuary protects the sole habitat of the Narcondum hornbill *(Rhytidocerous narcondumi)* which lives in the forest covering the lower slopes of the main peak.

North Reef Island Sanctuary

Established: 1977.
Location: Small island to the west of North Andaman.
Best time to visit: November to April.
Animals & birds of the park: This island sanctuary protects the habitat of the Andaman teal, of which it has the largest population, and the Nicobar pigeon.

Saddle Peak National Park

Established: 1979.
Location: Located on the west coast on Middle Andaman Division about 3 miles (5 km) from Digilipur town.
Size: 13 sq miles (33 sq km).
Best time to visit: November to April.
Animals & birds of the park: Largely hill top and ridge evergreen forest threatened by illegal settlement and encroachment. Magnificent display of birdlife, including the Andaman hill myna and Andaman imperial pigeon and also wild pig, salt water crocodiles and other reptiles.

South Sentinel Sanctuary

Established: 1977.
Location: Located about 78 miles (125 km) south of Port Blair.
Size: This marine sanctuary has a core area of only 0.62 sq miles (1.6 sq km).
Best time to visit: January to May.
Animals & birds of the park: Green-sea, olive ridley and leather backed turtles all lay eggs here and the white-bellied sea eagle hunts in the surrounding waters. There may still be some robber crabs.
Apart from the above the two "open" areas with good birdwatching are: **Chidya Tapu** on the extreme southern tip of South Andaman where there is a strip of coastal rainforest and mangrove leading to a long beach. Inland of the forest strip is agricultural land. The area is a 2-hour drive from Port Blair. **Munjari** on the west coast is

13 miles (20 km) from Port Blair and is a small area of forest with many interesting birds.

ANDHRA PRADESH

The largest of the four South Indian states, Andhra Pradesh, has a varied terrain with a rich and interesting population of birds and animals. Although it has 16 sanctuaries, including the large Nagarjunasagar Tiger Reserve, it has only one area with national park status. For up-to-date information, contact: The Chief Wildlife Warden, Saifabad, Hyderabad, AP 500004.

Andhra has a long and varied coastline with two great rivers (the Godavari and the Krishna) flowing west to east into the Bay of Bengal. There are mangrove forest along the estuaries, dry deciduous forest inland, and extensive open scrub stretching into the Deccan plateau. The southern half of the estate, below the Krishna river, is largely thorn forest while the northern part is more teak dominated. The Pulicat lake is one of South Asia's largest lagoons and an important centre for both resident and migratory water birds.

Coringa Sanctuary

Established: 1978.
Location: 12.5 miles (20 km) south of Kakinada in the Godavari river delta.
Size: 90 sq miles (235 sq km).
Best time to visit: November to March (temperatures can go up to 96˚F/36˚C).
Animals & birds of the park: The sanctuary is home to otters, fishing cats, the salt water (estuarine) crocodile *(Crocodylus porosus)* and many water birds.

Eturanagaram Sanctuary

Established: 1953.
Location: In Warangal District 10 miles (17 km) from Eturanagaram near the borders of Madhya Pradesh, Maharashtra and Andhra Pradesh consisting of mixed dry deciduous and teak forest.
Size: 313.5 miles (812 sq km). The core area consists of 85 sq miles (219 sq km).
Best time to visit: March to May (up to 114˚F/46˚C); November to March are cooler and more pleasant months.
Animals & birds of the park: The park harbours many mammals including tiger, leopard, sloth bear, gaur, sambar, chousingha (four horned antelope), chinkara, mouse deer, blackbuck, and leopard cat along with very interesting birdlife.

Kawal Sanctuary

Established: 1965.
Location: In Adilabad District about 175 miles (280 km) north of Hyderabad consisting of dry deciduous hill forest with teak over uneven terrain.
Size: 345 sq miles (893 sq km).
Best time to visit: February to May (up to 112˚F/44˚C).
Animals & birds of the park: Tiger, leopard, sloth bear, gaur and chousingha, among others.

Kinnersani Sanctuary

Established: 1977.
Location: In Khamman District surrounding the Kinnersani Reservoir 106 miles (170 km) north of Vijayawada.
Size: Core area of 86 sq miles (222 sq km) and buffer zone of 160 sq miles (413 sq km).
Best time to visit: November to June (summer maximum 120˚F/49˚C, drops to 50˚F/10˚C in January.)
Animals & birds of the park: This undulating sanctuary of mixed forest is home for a good range of mammals and bird species, including tiger, dhole, leopard, gaur, wild buffalo and sloth bear.

Kolleru Sanctuary

Established: 1963.
Location: In West Godavari District 40 miles (63 km) east of Vijayawada surrounding the Kolleru lake, between the Krishna and Godavari deltas.
Best time to visit: Late October to February.
Animals & birds of the park: The sanctuary consisting of wetland and marsh in a natural shallow depression surrounding the Kolleru lake extends over 232 sq miles (600 sq km) after the northeast monsoon. Many migratory ducks and resident water birds, including the pelicans of the famous pelicanry at the village of Aredu, use the lake for breeding.

Manjira Sanctuary

Established: 1978.
Location: In Medak District on the banks of the Manjira river about 34 miles (55 km) north of Hyderabad.
Size: 12.5 sq miles (20 sq km).
Best time to visit: November to February (cool), March to June.
Animals & birds of the park: This small pocket of riverine forest harbours many water birds and mugger crocodiles along with two species of fresh-water turtles.

Nagarjunasagar Srisailam Sanctuary (Tiger Reserve)

Established: 1978.
Location: Situated in the Srisailam District, the reserve spans the Krishna river with a dam forming the Nagarjunasagar reservoir. The area is dissected by deep winding gorges which cut through the Mallamalai hills.
Size: This sanctuary with an area of 1,374 sq miles (3,568 sq km) is largest of India's tiger reserves, with a core area of 463 sq miles (1,200 sq km). The sanctuary came under Project Tiger in 1983. It is proposed to give the core area of 463 sq miles (1,200 sq km) national park status.
Best time to visit: October to June (summer maximum 108˚F/43˚C).
Animals & birds of the park: A range of vegetation types, from dry scrub to dry mixed deciduous forest to the west and south and moist valleys with bamboo and tropical thorn forest to the east covers this sanctuary. The range of animals includes the leopard, sloth bear, palm civet, wolf, striped hyena in addition to tigers. Also found are barking deer, nilgai, chinkara, chousingha, sambar, chital, langur, bonnet macaque and Indian pangolin.

Neelapattu Sanctuary

Established: 1976.
Location: In Nellore District 75 miles (120 km), north of Chennai at the coastal village of Neelapattu.
Size: 1.5 sq miles (4.5 sq km).
Best time to visit: November to March.
Animals & birds of the park: The focal point is the village tank which, during the winter, becomes a large and mixed heronry.

Pakhal Sanctuary

Established: 1952.
Location: In the district of Warangal. The sanctuary is set around the Pakhal Lake about 112 miles (180 km) northeast of Hyderabad.
Size: 339 sq miles (878 sq km).
Best time to visit: November to June (summer temperatures range from 81˚F/27˚C to well over 100˚F/38˚C).
Animals & birds of the park: Interesting bird life, including a heronry, and an extensive range of animals are found in this sanctuary.

Papikonda Sanctuary

Established: 1978.
Location: In Rajahmundry District on the banks of the Godavari river as it cuts through the Eastern Ghats on the Papikonda range.
Size: 228 sq miles (590 sq km).
Best time to visit: November to June.
Animals & birds of the park: The steep slopes of the Papikonda Range with its mixed forest along the banks of the Godavari river is home for the tiger, leopard, chousingha and wolf. Many water birds are also found in the sanctuary.

Pocharam Sanctuary

Established: 1952.
Location: The sanctuary is located in Medak District on the banks of the Pocharam Lake 72 miles (115 km) north of Hyderabad.
Size: 50 sq miles (129 sq km).
Best time to visit: Late October to May.
Animals & birds of the park: The scrub and mixed forest of the sanctuary contains tiger, leopard, sloth bear, chausingha and wild boar. Flamingoes and other water birds are attracted by the lake.

Pranahita Sanctuary

Established: 1980.
Location: Located along the Pranahita river along the Andhra Pradesh-Madhya Pradesh border.
Size: 52 sq miles (136 sq km).
Best time to visit: November to May.
Animals & birds of the park: The mixed teak forest of the sanctuary harbours a few gaur, tiger, leopard, sloth bear, chausingha and others, and some water birds.

Publicat Sanctuary

Established: 1976.
Location: The Pulicat Sanctuary is located on the Pulicat lagoon on the southeastern coast of the state. The southern mouth of the large lagoon is in Tamil Nadu.
Size: Of the 224 sq miles (580 sq km) about 193 sq miles (500 sq km) lies in Andhra Pradesh.
Best time to visit: Late October to March.
Animals & birds of the park: Large flocks of flamingoes, many migrant shore birds and local residents are seen in and around the lagoon.

Rollapadu Sanctuary

Established: 1985.
Location: In the Kurnool District at the northern end of the Erramala range of hills.
Size: 1.5 sq miles (4 sq km). A buffer zone has been proposed but there is a large cattle and human population.
Best time to visit: May to June for minor nesting and August to December for major nesting.
Animals & birds of the park: This undulating grassland was established as a sanctuary for the resident great Indian bustard. In 1988 there were 60 odd of these rare birds. Another rare bird breeding here is the lesser florican. Animals found in the sanctuary include blackbuck, wolf, jackal, fox and blacknaped hare.

Shri Venkataswara Sanctuary

Location: At the southern end of the Velikonda Range of hills north of Tirupati.
Size: 196 sq miles (507 sq km) of which the 115 sq miles (300 sq km) core area has been proposed as a national park.
Best time to visit: November to May.
Animals & birds of the park: One of the few preserved southeastern deciduous forest with endemic species of both flora and fauna such as the red sanders trees and the golden gecko.

Siwaram Sanctuary

Established: 1978.
Location: In Adilabad District on the Godavari river near the Madhya Pradesh border.
Best time to visit: November to March.
Animals & birds of the park: Holds a wide range of animal and bird life.

Other areas have been proposed as sanctuaries and some existing sanctuaries proposed as national parks. Many of the new sanctuaries are in the eastern ghats near the Orissa border. Among the areas proposed are:

Donubhavi National Park & Sanctuary

An area of 116 sq miles (300 sq km) and 270 sq miles (700 sq km) respectively includes the southern limit of sal forest interspersed with teak. Situated in Srikakulem District in the northern part of the eastern ghats near the Orissa border. Elephants migrate through this area.

The GBM National Park & Sanctuary

Covering a total of 116 sq miles (300 sq km) and 371 sq miles (962 sq km) respectively in the Nallamalli hill ranges of Kurnool District. Mainly arid mixed deciduous forest with teak and bamboo. The area has a viable population of tiger, leopard, dhole, sloth bear, sambar and chausingha.

Gudem-Marripakala National Park & Sanctuary

Another large area of 132 sq miles (341 sq km) and 270 sq miles (700 sq km) respectively. With an altitude range of between 328 ft (100 metres) this mostly moist deciduous forest is rich in both plants and the distinctive birds of the eastern ghats.

Lankamalai Sanctuary

A 116 sq mile (300 sq km) sanctuary has been proposed in the Lankamalai range of the eastern ghats in Cuddapah District. On 14th January 1986 the Mumbai Natural History Society rediscovered the Jerdon's or double-banded courser *(Cursorius bitoraquatus)* last recorded in 1900.

Sriharikota Sanctuary

This 8 sq mile (22 sq km) proposed sanctuary for the saltwater crocodile and other rare biotypes is also the launch area for India's space program and could easily be protected.

ARUNACHAL PRADESH

Being close to the Chinese border, this area is sensitive and most of the region is closed to tourism. Permits for the "open areas" can be applied for through Indian embassies and high commissions abroad or from the Ministry of Home Affairs, Foreigners Wing, Lok Nayak Bhawan, Khan Market, New Delhi 110003. Allow at least 6–8 weeks for the application to be processed.

The area has a rich and varied Adivasi culture with the 650,000 population drawn from 82 different peoples.

The state ranges from tropical grasslands in the south and moist evergreen forest to alpine scrub and permanent ice. The deep river valleys act as barriers and some mammal and bird species are limited to certain areas. The gibbon, for example, is restricted to the south of the Brahmaputra river. The Botanical Survey of India in their Red Data list include some extremely rare rhododendrons, of which 40 species are found in the state and many are endemic.

The bird life of Arunachal, as with most of north-eastern India, is extensive, fascinating and still little known. Being on the boundary of the Palaearctic, Chinese, Malayan and Indian biogeographic regions gives this small state a special significance. The altitudinal range and the extent of unspoilt forest cover together with the range of Adivasi cultures make this area one of the least known in Asia. At present the state has two areas of 1,453 sq miles (3,764 sq km) or 4.5 percent of the state. Proposals have been made to increase the protected area to 4,320 sq miles (11,187 sq km) or 13.5 percent of the state.

D'ering Sanctuary

Established: 1978.
Location: In East Siang Frontier Division at the base of the Miri Hills.
Size: 74 sq miles (190 sq km). The core area of 39 sq miles (100 sq km) has been proposed as a national park.
Best time to visit: November to March.
Animals & birds of the park: The sanctuary has a major population of wild buffalo, swamp deer and migratory waterfowl.

Itanagar Sanctuary

Established: 1978.
Location: In Subansri Frontier District 9.5 miles (15 km) from Itanagar town. The area is hilly with the highest point at 3,820 ft (1,165 metres).
Size: 54 sq miles (140 sq km)
Best time to visit: October to April.
Animals & birds of the park: The semi-evergreen forest supports a small tiger population and visiting herds of elephants.

Mehao Sanctuary

Established: 1980.
Location: In West Siang District in the Mismi Hills at an altitude of 1,313 ft (400 metres) to over 11,500 ft (3,500 metres).
Size: 109 sq miles (282 sq km).
Best time to visit: November to March.
Animals & birds of the park: This sanctuary which gets an extremely high rainfall (165 inches/419 cm) has a fascinating range of wildlife including clouded leopard, hoolock gibbon, leopard cat, musk deer, spotted lingsang and swamp deer.

Moiling National Park

Location: Located in medium altitude in the main range of the eastern Himalayas.
Size: The existing park of 186 sq miles (483 sq km) is now part of a much larger proposed integrated unit of 579 sq miles (1,500 sq km).
Best time to visit: February to April.
Animals & birds of the park: This hilly park is covered in rich oak and rhododendron forests. Apart from a good pheasant population and wild population of white winged wood duck, the park's fauna includes clouded leopard, red panda and spotted lingsang.

Namdapha National Park Tiger Reserve

Established: 1972.
Location: Situated in the far eastern corner of the state drained by the three tributaries of the Noa Dehing river which then runs into the Brahmaputra. The park extends from about 650 ft (200 metres) above mean sea level to 14,800 ft (4,500 metres) giving it a wide range of habitat.
Size: 766 sq miles (1,985 sq km). The area is proposed biosphere reserve and extensions of 97 sq miles (250 sq km) to incorporate the rich temperate forest to the north are planned.
Best time to visit: October to March.
Animals & birds of the park: This park and tiger reserve has perhaps the widest diversity of habitats of any of South Asia's protected areas. It is the only area with four major predators: tiger, leopard, clouded leopard and snow leopard. The forest ranges from wet evergreen at lower levels through

mixed deciduous to temperate alpine forest at the upper reaches. One botanist suggested it would take 50 years to complete a comprehensive survey of the area. The diverse habitat and local climates hold a fascinating mix of Indo-Burman, Indo-Chinese and Himalayan wildlife. Apart from the major predators, the animals include gaur, goral, takin, musk deer, Hoolock gibbon, slow loris, binturong and red panda. Hornbills and pheasants are among the great range of birds. It is important to Project Tiger as the northeastern limit of the Indian tiger's range.

Pakhui Sanctuary

Established: 1977.
Location: In the south-western part of Arunachal Pradesh in East Kameng District along the Dafla hills at the base of the Eastern Himalayas. The sanctuary is adjacent to Sonai-Rupai and Nameri Sanctuaries in Assam.
Size: 333 sq miles (862 sq km). An extension of 77 sq miles (200 sq km) has been suggested and 194 sq miles (500 sq km) given national park status.
Best time to visit: December to March.
Animals & birds of the park: The mixed forest includes elephant, tiger, leopard, sloth bear and slow loris.

National parks have been proposed at Tawang, Lado, Walong and Dibang along with new sanctuaries at Kalaktang, Palin and the Tirup evergreen forest.

ASSAM

Today's state of Assam follows the course of the Brahmaputra river from the point where it leaves the Eastern Himalayas in Arunachal Pradesh until it turns south into Bangladesh. Traditionally known for its tea, its forests and its wildlife, Assam is a fascinating mix of industry (10 percent of India's oil is produced near Duliajan), agriculture, history, religion and great natural beauty.

Some of Asia's great conservation success has been in Assam. The Greater One-horned rhinoceros was on the brink of extinction 50 years ago but, thanks to proper management and experiments in translocation, its future now seems secure. The swamp deer and the Asiatic water buffalo have in recent years been equally threatened. In 1971 both the hispid hare and the pygmy hog were rediscovered in the grasslands to the north after being thought extinct for about 30 years.

Permission for visitors to enter Assam should be made to any Indian Embassy or High Commission abroad or direct to the Ministry of Foreign Affairs, Foreigners Wing, Lok Nayak Bhawan, Khan Market, New Delhi 110 003.

There are two proposed biosphere reserves at Kaziranga and Manas.

Barnadi Wildlife Sanctuary

Established: 1980.
Location: Along the Bhutan border in Sonipur District consisting of grassland habitat along the Deosunga river.
Size: The sanctuary has an area of only 10 sq miles (26 sq km). An extension to 39 sq miles (100 sq km) has been proposed to make this a viable sanctuary.
Best time to visit: November to March.
Animals & birds of the park: This sanctuary was established to protect the few remaining habitats of the extremely elusive hispid hare and pygmy hog. Unfortunately these grasslands are subject to pressure from local villagers cutting grass and grazing cattle. Bengal floricans are reported and elephant, tiger and leopard also pass through the area.

Garampani Sanctuary

Established: 1952
Location: In eastern Assam along the Nagaland border adjacent to the Rengma and Naga Hills.
Best time to visit: November to March.
Animals & birds of the park: This small sanctuary has a few tiger, leopards, elephants (which cross from the Rengma hills to the foothills of the Naga hills) and other mammals. The area is good semi-evergreen forest with gibbons and hornbills.

Kaziranga National Park

First established in 1908 as a reserve forest with only about a dozen rhinos. In 1926 Kaziranga became a game sanctuary and in 1974 it was declared a national park.
Location: It lies on the south bank of the Brahmaputra and its southern boundary follows, for the most part, the Mora Diphlu river and runs parallel to National Highway no. 37.
Size: It now covers an area of 269 sq miles (696 sq km).
Best time to visit: November to March.
Animals & birds of the park: Kaziranga is justly famous not only for the Greater One-Horned rhinos but also for wild buffalo, the magnificent swamp deer and hog deer. Tiger, wild boar, Hoolock gibbon, capped langur and ratel (badger) are among the other animals seen. Mihimukh is a good viewing area.

Laokhwa Sanctuary

Established: 1979.
Location: Situated on the south bank of the Brahmaputra north of Nagaon.
Size: 27 sq miles (70 sq km).
Best time to visit: November to April.
Animals & birds of the park: This small sanctuary has a small but viable population of rhino and wild buffalo. The habitat is similar to Kaziranga, with area of swampy flats, tall grasses and scattered trees.

Manas Sanctuary & Tiger Reserve

Established: 1928.
Location: The park lies across two rivers, the Manas and its tributary the Hakua, along the Assam-Bhutan

border. The protected area continues north into the Bhutan foothills.
Size: First established as a small reserve the area now protected is over 1,094 sq miles (2,840 sq km) of which 151 sq miles (391 sq km) form the core area and comes under Project Tiger.
Best time to visit: November to March.
Animals & birds of the park: With an unparalleled variation of habitat for such a narrow strip the scenery of Manas is considered by many the most attractive of any Indian park. To the south are grasslands with rivers and their pebble-banks and islands, spreading as they leave the great forests of the Bhutan hills. On the Indian side, the forests are mixed deciduous with open glades. Manas holds viable populations of 19 of India's most endangered animals. Great herds of elephants, up to 2,000 in the area, migrate across the border. Rhino, wild buffalo, gaur, swamp deer, capped langur and clouded leopard are just a few of the animal species. The tiger population here is perhaps the most dense of all the tiger reserves. Pygmy hog and hispid hare are also found here but are rarely seen. On the Bhutan side, the only extant group of golden langur are found. The rich birdlife is distinctive and abundant. The whole area has been declared a World Heritage Site in the UNESCO program. Manas forms the core of a proposed wildlife corridor extending from Buxa and Jaldapara to the west in West Bengal through Ripu-Chirang to Barnadi and into the forests of Bhutan to the north and Arunachal Pradesh to the north-east.

Orang Sanctuary

Location: In Sonitpur District on the north bank of the Brahmaputra river.
Size: 29 sq miles (75 sq km).
Best time to visit: November to April.
Animals & birds of the park: One of the oldest protected areas, this small sanctuary of swampy grassland habitat holds rhino, wild buffalo, swamp deer, elephant and tiger among others.

Sonai Rupai Sanctuary

Location: In the Dooar grasslands at the base of the Dafla hills along the border with Arunachal Pradesh.
Size: 67 sq miles (175 sq km).
Animals & birds of the park: Although not seen since 1940, the area possibly still holds pygmy hog and hispid hare which are still known to be in the Rowta Reserve Forest to the west and the Balipara Reserve Forest to the east. Tiger, a few swamp deer, buffalo and hog deer are found.

BIHAR

Lying at the eastern end of the Gangetic plain, Bihar is a state of extremes: subject to drought and flood; of great natural wealth but having some of India's poorest villagers. The state has some important and interesting sanctuaries. As in many other parts of India, most of the mammal sanctuaries were once private forests which, with Independence in 1947, were subject to over-exploitation by *shikaris* (hunters), villagers and others. Most of the state has long, hot dry summers relieved by moderate rainfall from July to September.

The state is divided into two distinct zones with the Gangetic Plain to the north and the forested Chota Nagpur Plateau to the south. Throughout the plains numerous small and unprotected wetlands are important wintering grounds for migratory waterfowl. The **Kabar Tal** has been proposed as a National Park of 8 sq miles (20 sq km) with an equally small surrounding buffer sanctuary to protect this important wetland.

Bhimbandh Sanctuary

Location: On undulating ground south of the Ganga about 132 miles (212 km) southeast of Patna.
Size: 262 sq miles (681 sq km).
Best time to visit: November to March, April to June are also good but hot.
Animals & birds of the park: The mixed deciduous forest – mostly sal – is potentially a good park if given more protection. Leopard, sloth bear, wolf, chausingha, chital, etc.

Dalma Sanctuary

Established: 1976.
Location: In Ranchi District in south-eastern Bihar on the West Bengal border north of the steel city of Jamshedpur.
Size: 74 sq miles (193 sq km).
Best time to visit: December to March; April to June are also good but hot.
Animals & birds of the park: The sal and mixed deciduous forest have wolf, mouse deer, sloth bear, chital and the occasional elephant.

Gautam Buddha Sanctuary

Established: 1970s and enlarged in 1976.
Location: In Gaya District about 25 miles (40 km) northeast of Gaya along the river Son.
Size: 100 sq miles (259 sq km).
Best time to visit: December to April.
Animals & birds of the park: Mainly sal and thorn scrub. Previously protected as a private shikar reserve but for 20 years subject to cattle grazing, illegal felling and other disturbances. A few tiger, chital, chinkara and sloth bear.

Hazaribagh Sanctuary

Established: 1954.
Location: In Hazaribagh District on the national highway about 12 miles (20 km) from the town of Hazaribagh.
Size: 71 sq miles (184 sq km).
Best time to visit: October to April.
Animals & birds of the park: It was previously a shikar reserve of the Raja of Ramgarh. The undulating sal forest is rich in birdlife but few mammals are seen during the day. In the evening and after dusk sambar, nilgai, chital and wild boars can be observed, along with the occasional leopard and a few tigers.

Kaimur Sanctuary

Location: In Shahabad Division on the west bank of river Son near the border with Uttar Pradesh.
Size: 518 sq miles (1,342 sq km).
Best time to visit: November to March. Extremely hot summers (118˚F/48˚C).
Animals & birds of the park: Chinkara, chausingha, wolf and a few leopards.

Lawalong Sanctuary

Established: 1978.
Location: To the southwest of Hazaribagh.
Size: 81 sq miles (211 sq km).
Best time to visit: November to March.
Animals & birds of the park: Mixed deciduous forest (largely sal). Leopard, chital, black panther (melanistic leopards) have been reported.

Mahuadaur Sanctuary

Established: 1976.
Location: In Ranchi District near the Madhya Pradesh border along the Burha river.
Size: 24 sq miles (63 sq km).
Best time to visit: November to February.
Animals & birds of the park: The sanctuary with sal forest flanking a deep valley cut by the Burha river was established to protect the grey wolf.

Palamu (Betla) Sanctuary & Tiger Reserve

Established: 1960.
Location: In Palamu District lying on the northern edge of the Chota Nagpur plateau drained by the Koel river and its tributaries. The park's altitude ranges from 950 ft (300 metres) to 3,800 ft (1,200 metres).
Size: The park has been extended to cover 377 sq miles (979 sq km) of which 77 sq miles (200 sq km) is the core.
Best time to visit: October to May.
Animals & birds of the park: The world's first tiger census took place here in 1932 and in 1973 Palamu was one of the first reserves to be identified for inclusion under Project Tiger. The sanctuary has an undulating landscape of sal forest with pockets of bamboo and has a range in annual rainfall. The northern part of the reserve receives only half of the average 50 inches (1,250 mm) that the southern part receives. Two ruined forts stand near the Auranga river. A large range of mammal species and about 140 species of birds have been identified. Elephant, gaur, chital, sambar, nilgai, and, of course, the tiger. Good viewing from the watchtower at Hathibajhawa (Betla) and, during summer, at Madhuchan.

Udaipur Sanctuary

Established: 1978.
Location: In Champaran District in the Nepal border 127 miles (205 km) from Patna.
Size: 3.5 sq miles (9 sq km).
Best time to visit: October and November for migrating waterfowl.
Animals & birds of the park: This small wetland reserve has a resident waterfowl population and winter migrants.

Valmiki Tiger Reserve

Established: 1970.
Location: In Champaran District along the Nepal border. To the north is the Chitwan National Park in Nepal; to the west the Gandak river and the border with Uttar Pradesh and; to the east the Kapan river.
Size: In 1990 the sanctuary became the country's 18th Project Tiger Reserve and now has an area of 324 sq miles (840 sq km) of which 130 sq miles (335.6 sq km) is the core.
Best time to visit: December to April.
Animals & birds of the park: The reserve is covered with moist mixed deciduous forest, riverine forest and grasslands. The 1989 census reported 81 tigers and 32 leopards in the reserve, which had fallen to 49 tigers in 1993. Animals migrate from Chitwan, especially tiger, rhino and gaur. Resident species include hog deer, chital, sambar, sloth bear and serow.

Other sanctuaries in Bihar are **Nagi Dam** (Monghyr District), **Rajgir** (Nalanda District) and **Topchanchi** (Danbad District).

GOA, DAMAN & DIU

Neither Daman or Diu have any protected area, although the flats and narrow channel separating Diu from the mainland have plenty of shore birds.

Goa's protected areas are all in the foothills of the Western Ghats.

Bhagwan Mahavir National Park & Molem Sanctuary

Established: The sanctuary was established in 1967 and the national park in 1978.
Size: Their present areas are 98 sq miles (255 sq km) and 41 sq miles (107 sq km) respectively. The national park forms the core area.
Best time to visit: October to March.
Animals & birds of the park: The forest is mixed and wet deciduous with abundant birdlife and a fair mammal population – leopard, sloth bear, chital, etc.

Bondla Sanctuary

Established: 1969.
Size: This is the smallest of Goa's sanctuaries.
Best time to visit: October to March.
Animals & birds of the park: Sambar, wild boar and a few leopard.

Cotigao Sanctuary

Established: 1968.
Location: On undulating hills where the Western Ghats almost touch the coast on the Karnataka border.
Size: 40 sq miles (105 sq km).
Best time to visit: October to March.
Animals & birds of the park: Sloth bear, sambar, chital, pangolin, leopard, etc.

GUJARAT

The westernmost state of India has many species unique to it. It is the last home of the Asiatic lion and the

Indian wild ass. Gujarat has little forest but 450 species of birds – some migrant from Africa. Many local subspecies of the birds are documented in the excellent and privately published *Birds of Saurashtra* by the late M.K. Dharmakumarsinhji. India's first Marine National Park was established by the Gujarat Government.

Gir National Park & Lion Sanctuary

Established: 1965.
Size: This national park forms a core area of 100 sq miles (259 sq km) with 444 sq miles (1,153 sq km) of the sanctuary providing a buffer zone around it.
Best time to visit: December to April (closed during the monsoon to mid-October)
Animals & birds of the park: Only some 10 percent of the total area is forested. The area was originally protected by Junagadh State and, although hunting was banned from 1948 onwards, the greatest pressure was from thousands of cattle that grazed the area. An area of hot humid summers (112˚F/44˚C) and cool winters. The monsoon brings little rain. The park has a good tourist infrastructure and most of the many species in the park can be seen. The only extant population of Asiatic lions is found here.

Barda Sanctuary

Established: 1979.
Location: North of Porbandar.
Size: 109 sq miles (282 sq km).
Best time to visit: November to February.
Animals & birds of the park: Mostly thorn forest north of Porbander, the area was once a home for lions but now lacks a corridor to link it to Gir. The area has suffered now from overgrazing and fuel-wood collection. Wildlife is scarce.

Dhangadhra Sanctuary

Established: 1973.
Location: In the Little Rann of Kutch.
Size: Covering a huge area of 1,864 sq miles (4,840 sq km).
Best time to visit: January to June.
Animals & birds of the park: This special sanctuary was set up for the Indian wild ass. The Rann is a flat saline wilderness with little vegetation. Other animals in the area include blackbuck, a few chinkara, wolf and desert cat. During the monsoon parts of the area becomes flooded and the wild ass move to elevated patches known as *bets*.

Jessore Sloth Bear Sanctuary

Established: 1978
Location: Near the border with Rajasthan.
Size: 69 sq miles/179 sq km.
Best time to visit: November to March.
Animals & birds of the park: The hilly terrain with scrub and thorn forest cover has sloth bear, nilgai and leopard.

Khijadaya Sanctuary

Established: 1981.
Location: South of Jamnagar.
Size: 2.5 sq miles (6 sq km).
Best time to visit: November to January.
Animals & birds of the park: This small wetland sanctuary protects many species of birds.

Marine National Park & Sanctuary (Pirotan)

Established: The sanctuary was established in 1980 and the National park in 1982.
Location: Near Jamnagar town.
Size: The sanctuary had an area of 176 sq miles (457 sq km) and the National Park was formed with an additional 62 sq miles (162 sq km) as the core area.
Best time to visit: November to January.
Animals & birds of the park: Green-sea, leather-backed and olive ridley turtles along with other fascinating life can be seen.

Nal Sarovar Sanctuary

Established: 1969.
Location: Southwest of Ahmedabad.
Size: 44 sq miles (115 sq km)
Best time to visit: November to February.
Animals & birds of the park: The wetland and lake area is extensive and during the winter it is home to migrant geese, ducks and flamingoes. Local waterbirds also come here to feed, but not breed.

Velavadar National Park

Established: 1969.
Location: Near Bhavnagar.
Size: 13 sq miles (34 sq km).
Best time to visit: November to May.
Animals & birds of the park: This scrubland park has the highest concentration of blackbucks anywhere in the subcontinent. Also a few wolves. Excellent viewing.

Other sanctuaries in Gujarat include **Hingolgarh** (Rajkot District), **Narayan Sarovar** (Kutch District), **Ratna Mahal** (Panchmahals District), **Dhumkhal Sloth Bear Sanctuary** (Bharuch District), **Vansda National Park** (Bulsar District).

For further information contact: Conservator of Forests, Gandhinagar, Gujarat 382016.

HARYANA

Although Haryana has only one well-known sanctuary (Sultanpur near Delhi) there are in fact some others along with interesting areas west of Hissar where blackbuck and even bustard are found. For further information, contact: The Wildlife Warden, Kothi No. 971, Sector 9, Panchkula, Ambala District, Haryana.

Bhindawas Bird Sanctuary

Established: 1986.
Location: Near the village of Bhindawas in Rohtak District.
Size: 1.6 sq miles (4.2 sq km).
Best time to visit: November to February.
Animals & birds of the park: The area needs to be developed and has the potential to be a good birding sanctuary.

Sultanpur Jheel Bird Sanctuary

Established: 1971.
Location: 30 miles (48 km) from Delhi.
Size: The jheel (lake) is less than a square mile in area (298 acres) and a large buffer area needs to be created.
Best time to visit: November to February.
Animals & birds of the park: Under threat from the State Toursim Department's tourist complex which both pollutes the lake. Three-quarters of the total area is marshy and the rest under babul *(Acacia spp.)* trees. Within the lake about 30 artificial islands were planted with babul in 1979 and these have become breeding areas for **egrets, cormorants, ibises and herons.** There are few local breeding birds, but the main attraction are the migratory birds who come in large numbers during late October and November.

Other sanctuaries, established in the late 1980s, include **Chautala** (45 sq miles/115 sq km) near the Rajasthan and Punjab border in Sirsa District, **Chilchilla** (near Kaithal in Kurukshetra District), **Nahar** (Rohtak District) and **Saraswati Plantation** (Kurukshetra District).

HIMACHAL PRADESH

This state rises from the plains of the Punjab to the Great Himalayas and the Tibetan plateau beyond. Because of the range in altitude, the state has a wide range of flora and fauna. Twenty-eight areas are protected, including one national park. Most of the sanctuaries are in areas unconnected by public transport. The most enjoyable and in fact the only practical way to visit most of the areas is by trekking. It is possible to trek in much of Himachal and to buy food in many villages, although a couple of days' food should always be carried. One of the threats to Himachal's sanctuaries is the human pressure and continued exploitation of the forests. The birdlife is rich and varied. Most of the sanctuaries are in the temperate and subtropical areas of the lower Himalayas.

Chail Sanctuary

Established: 1975.
Location: Not far from Shimla, close to the Sutlej river.
Size: 42 sq miles (108 sq km).
Best time to visit: March to December.
Animals & birds of the park: The subtropical pine and temperate forests of this sanctuary affords good viewing of birds including cheer pheasants, leopards and martens.

Daran Ghati Sanctuary

Established: 1974.
Location: Close to Kinnaur on the Shimla–Kinnaur road.
Size: 64 sq miles (166 sq km).
Best time to visit: April to July and September to October.
Animals & birds of the park: Among the mammals that live in the temperate and mixed coniferous forest of this sanctuary are leopard, musk deer, civet, marten, bear and goral. Monal, kaleej and koklas pheasants are some of the birds found here.

Govind Sagar Sanctuary

Established: 1974.
Location: On the shores of the Govind Sagar reservoir near the town of Bilaspur.
Size: 38 sq miles (100 sq km).
Best time to visit: October to December.
Animals & birds of the park: Migratory water birds.

Great Himalayan National Park

Established: 1984.
Location: Southeast of Kullu valley.
Size: This is the largest of Himachal's protected areas covering 669 sq miles (1,736 sq km).
Best time to visit: April to June and September to October.
Animals & birds of the park: The Sainj and Tirthan valleys are less disturbed than many parts of Himachal and hold good population of many species of mammals as well as birds.

Kalatop Khajjur Sanctuary

Established: 1958.
Location: Near the hill station of Dalhousie.
Size: 18 sq miles (47 sq km).
Best time to visit: May to June and September to November.
Animals & birds of the park: This small area of mixed temperate forest ranges from 3,888 to 8,753 ft (1,185–2,668 metres) above sea level. Monal pheasants, woodland birds and hawks.

Kanawar Sanctuary

Established: 1954.
Location: 22 miles east of Kullu on the north side of Parvati river.
Size: 2.33 sq miles (6 sq km).
Best time to visit: May to June and September to October.
Animals & birds of the park: The mixed forest of deodar, oak, pine, etc., ranges from altitudes of 5,900 to 15,856 ft (1,800–4,833 metres). Tahr, serow, goral, bharal, musk deer and leopard are among the animals, and koklas, Kaleej, chir and western tragopan among the pheasants seen.

Kugti Sanctuary

Established: 1962.
Location: In Chamba District.
Size: 45 sq miles (118 sq km).
Best time to visit: May, June, September and October.
Animals & birds of the park: The temperate forest with oak scrub at the higher levels (highest point: 19,600 ft/5,975 metres). Musk deer, tahr, ibex, barking deer, leopard are seen.

Lippa Asrang Sanctuary

Established: 1962.
Size: 68 sq miles (176 sq km).
Best time to visit: April to October.
Animals & birds of the park: The temperate and coniferous forest have ibex, musk deer, bharal and leopard.

Manali Sanctuary

Established: 1954.
Location: Near Manali at the head

of the Kullu valley.
Size: 12 sq miles (31 sq km).
Best time to visit: May, June, September and October.
Animals & birds of the park: Tahr, serow, musk deer, leopard are seen. Snow leopard has also been reported. Tragopan, chir, and monal pheasants are present.

Rakchhalm Chitkul Sanctuary

Established: 1962.
Location: In Kinnaur District.
Size: 86 sq miles (223 sq km).
Best time to visit: April to June and September, October.
Animals & birds of the park: This trans-Himalayan sanctuary (highest point: 17,933 ft/5,466 metres) protects the high-altitude ecology of this area.

While Himachal Pradesh has an impressive list of sanctuaries, many of them were established for shooting in the 1950s and '60s and little, if any, wildlife management has taken place since the introduction of Wildlife Protection Act in 1972. None has been enlarged. The western Himalayas is a magnificent area with wonderful forests, but with ever increasing human pressure on the environment, strong administration is required to protect, conserve and develop the remaining natural habitat.

JAMMU & KASHMIR

In the Central and Western ranges of the Himalayas are the mountains of Kashmir. In fact the state ranges from the Punjab plains to the Tibetan plateau. The north is bounded by the Karakoram mountains, the east by Tibet and the Great Himalayan range. The Indus river cuts through the state as it flows east to west into Pakisthan. Large areas of good wildlife habitat fall outside protected areas: the **snow leopard** range covers most of Ladakh district; the **Tibetan wild ass** (Kiang) and the **black-necked crane** survive in fairly secure but extremely small numbers near the Chinese border, east of Leh. The western and southern parts of the state are affected by the monsoon, while precipitation beyond the Great Himalayan range is often limited to winter snowfall.

Conservation in Ladakh is fairly recent. Like Himachal Pradesh and Nepal, the only way to see much of the area is by trekking.

Dachigam National Park

Established: Declared a sanctuary after Independence, it became a national park in 1981.
Location: In the Himalayan foothills west and north of Kashmir valley, in the catchment area of much of the drinking water supply of Srinagar.
Size: 54 sq miles (140 sq km).
Best time to visit: May to August for upper Dachigam and September to December for lower Dachigam.
Animals & birds of the park: The park originated as a game reserve and was further developed to protect the catchment area of the Dagwan river. Today the park is the home of the last viable population of hangul. Other species found include both the brown and black bear, musk deer and fox and over 150 species of birds.

Hemis High Altitude National Park

Established: 1981.
Location: Covering the Markha and Rumbak valleys in Ladakh District.
Size: 231 sq miles (600 sq km).
Best time to visit: May to September.
Animals & birds of the park: Most of the area is rocky and sparsely covered. Among the endangered mammals here are bharal, ibex, snow leopard and marmot. Over 50 bird species have been identified. The winters can be extremely cold and drop to -40˚F(-40˚C).

Jasrota Sanctuary

Established: 1984.
Location: On the right bank of the Ujh river in Jammu District.
Size: 3.75 sq miles (10 sq km).
Best time to visit: September to June.
Animals & birds of the park: This extremely small sanctuary, mostly of bamboo, supports a large number of chital, barking deer, wild boar, rhesus macaque.

Kishtwar National Park

Established: 1981.
Location: Encompassing the catchment area of the Chenab river in Kishtwar District.
Size: 154 sq miles (400 sq km).
Best time to visit: May to October.
Animals & birds of the park: Ranging between altitudes of 5,600 to 15,750 ft (1,700–4,800 metres) the forest is largely coniferous, including neoza pine and deodar. At higher altitudes the forests give away to alpine meadows and scrub. A few hangul, musk deer, markhor, ibex, grey langur and leopard can be seen.

Overa Sanctuary & Biosphere Reserve

Established: 1981.
Location: This sanctuary is located in the upper Lidder Valley above Pahalgam.
Size: Although only 12.5 sq miles (32 sq km), the area falls within the proposed Overa Biosphere Reserve of almost 154 sq miles (400 sq km).
Best time to visit: April to October.
Animals & birds of the park: The area is largely forested and has a good pheasant population and other birdlife. Mammals include hangul, musk deer, serow, langur, leopard.

Other sanctuaries include **Lungnag** (Kargil District), **Nandi** (Jammu District) and **Surinsar Mansar** (Udampur District). A second biosphere reserve at Gulmarg covering 112 sq miles (290 sq km) has also been proposed.

KARNATAKA

The forests of southern Karnataka in what was once Mysore State have long been famous for their rich and distinctive wildlife and magnificent forests. The great tracts of forest that remain today as

a legacy of the management and concern shown by the Mysore rulers are noted for elephant, gaur and other large mammals. Eleven of the 23 protected areas are within the rich and vulnerable Western Ghats. The forests of the Western Ghats contain many endemic bird and flora species. In the northern part of the state the dry thorn forests and scrub are home to many different species. In the dry deciduous scrub of Ranebennur, the **blackbuck** and an increasing number of **great Indian bustard** are found. The bustard has also returned to the scrub areas north of Bijapur, near the Maharashtra border.

Bandipur National Park & Tiger Reserve

Established: First established in 1930 and expanded in 1974.
Location: On the north and south of the Mysore–Ootacamund road and bounded on the northwest, west and south by Nagarahole, Wynad and Mudumalai parks respectively.
Size: First established with an area of 23 sq miles (60 sq km), the area was expanded to 266 sq miles (690 sq km) in 1974.
Best time to visit: March to June, September and October.
Animals & birds of the park: The hilly landscape in the shadow of the Western Ghats is intersected by rivers and streams. The gaur population has increased after the 1968 rinderpest epidemic. Herds of elephants are readily seen, as well as other large mammals.

Bannerghatta National Park

Established: 1974.
Location: On undulating terrain with valleys and hills; only 17 miles (28 km) south of Bangalore.
Size: 40 sq miles (103 sq km).
Best time to visit: September to June (open all year).
Animals & birds of the park: Mammal life is poor, although leopard, wild boar and sloth bear are occasionally spotted. Zoo-born tigers have been introduced to a large enclosed area. A few elephants still migrate through the area. Interesting scenery and good birdlife.

Bhadra Sanctuary

Established: 1874.
Location: On the Bhadra river valley ringed by the Bababudan range.
Size: 189 sq miles (490 sq km).
Best time to visit: October to May.
Animals & birds of the park: Most of the valley is covered with moist deciduous forest. Large gaur population, a few elephants, tiger, chital and sambar. It has been proposed to upgrade the sanctuary to national park status.

Biligir Rangasamy Temple Sanctuary

Established: 1974, extended in 1987.
Location: South of Mysore.
Size: The prior area of 125 sq miles (324 sq km) was later extended to 209 sq miles (540 sq km).
Best time to visit: October to May.
Animals & birds of the park: The sanctuary protects a southern spur of the Eastern Ghats and is a link with the forests extending from the Western Ghats. Elephant are occasionally seen on migration, plus gaur, chital, sambar and an occasional tiger. A local Adivasi group known as the Soliga live in the neighbouring forest.

Brahmagiri Sanctuary

Established: 1974.
Location: In southern Coorg near the border with Kerala. Borders Nagarahole National Park to the east.
Size: Currently 70 sq miles (181 km) it has proposed to extend the sanctuary northwards to 109 sq miles (282 sq km) and give it national park status.
Best time to visit: October to May.
Animals & birds of the park: The hilly terrain of this sanctuary has elephant, gaur, tiger, mouse deer, chital and sambar.

Daneli Sanctuary

Established: 1975.
Location: The area falls on the eastern slope of the Western Ghats.
Size: 322 sq miles (834 sq km).
Best time to visit: December to May.
Animals & birds of the park: Mostly moist deciduous forest, with some teak and bamboo. The sanctuary once covered a huge area of 2,212 sq miles (5,730 sq km) most of which was badly degraded. Large mammals include elephant, tiger, sambar, chital and the occasional wolf is seen.

Ghataprabha Sanctuary

Established: 1974.
Location: Next to the Ghataprabha river north of Belgaum.
Size: 11 sq miles (29 sq km).
Best time to visit: October to January.
Animals & birds of the park: This small wetland bird sanctuary has some resident as well as migratory species.

Kudremukh National Park

Established: 1988.
Size: 232 sq miles (600 sq km).
Best time to visit: September to May.
Animals & birds of the park: Established to protect the northern shola forest and an important lion-tailed macaque population. Other mammals found include tiger, leopard and gaur. The proposed 38 sq miles (100 sq km) **Ammedikal Sanctuary** will link the park, along a narrow neck of Western Ghat forest, with the new **Pushpagiri Sanctuary** (42 sq miles/108 sq km) in Coorg (Kodagu) District to the south.

Mookambika Sanctuary

Established: 1974.
Location: On the edge of the Western Ghats.
Size: Currently 95 sq miles (246 sq km) it may be expanded to 142 sq miles (367 sq km) and link up with **Someswara Sanctuary**.
Best time to visit: November to April.
Animals & birds of the park: Mixed semi-evergreen forest and tropical evergreen forest at the higher altitudes. Very high rainfall from early June. Tiger, sloth bear, lion-tailed macaque and chital are seen.

Nagarahole National Park

Established: In 1955 and further expanded in 1975.
Location: Along the Kabini reservoir south of Mysore.
Size: Present size of 221 sq miles (573 sq km). There is a proposal to extend the park to 278 sq miles (720 sq km) and include the Masal valley of Kakankote Reserve Forest and part of the upper Kaveri valley to the north.
Best time to visit: October to April.
Animals & birds of the park: Extremely attractive park with the Brahmagiri hills in the distance. The Kabini river has been dammed to form a large reservoir which separates the park from Bandipur National Park to the southeast. The game viewing is excellent and well organised. Large groups of gaur, elephant, the occasional tiger and leopard, chital and sambar are seen. Over 250 species of birds recorded.

Ranganathittu Bird Sanctuary

Established: 1940.
Location: Near Tipu Sultan's capital of Srirangapatnam on six tiny islands in the Kaveri River 10 miles (16 km) to the north of Mysore.
Best time to visit: June to November.
Animals & birds of the park: Nesting starts as early as June for many species. Scenically extremely beautiful. A few crocodiles, otters, and flying foxes (fruit bats) can be observed.

Ranibennur Blackbuck Sanctuary

Established: 1974.
Size: 46 sq miles (119 sq km).
Best time to visit: May to December for bustard; open throughout the year.
Animals & birds of the park: The sanctuary was established to check the rapid decline of blackbuck in northern Karnataka. The wolf, fox, jackal and great Indian bustard are also found. Mostly dry scrub and open undulating ground with some new eucalyptus plantation.

Sharavathi Valley Sanctuary

Established: 1974.
Location: In the Western Ghats.
Size: 166 sq miles (430 sq km).
Best time to visit: November to May.
Animals & birds of the park: The wet tropical evergreen forest and semi-evergreen forest of the sanctuary is contiguous with the Mookambika sanctuary to the south. Has high rainfall from June. Chital, gaur, sloth bear, macaque and sometimes tiger seen.

Shettihalli Sanctuary

Established: 1974.
Location: Near the town of Shimoga.
Size: 152 sq miles (395 sq km).
Best time to visit: November to May.
Animals & birds of the park: The mixed deciduous and semi-evergreen forest has tiger, elephant, chital and sambar.

Other protected areas in Karnataka include: **Anshi National Park** (96 sq miles/250 sq km in Uttara Kannada District); **Adi Chunchanagiri Sanctuary** (Mandya District); **Arabititu Sanctuary** (5 sq miles/13 sq km in Mysore District); **Cauvery Sanctuary** (197 sq miles/510 sq km in Mandya & Bangalore District); **Melkote Temple Sanctuary** (19 sq miles/50 sq km in Mandya District); **Nagu Sanctuary** (34 sq miles/88 sq km in Dakshina Kannada District); and **Talakaveri Sanctuary** (40 sq miles/105 sq km in Kodagu Dist).

Information on these and other protected areas can be obtained from: The Chief Wildlife Warden, Arnya Bhawan, 18th Cross, Malleshwaram, Bangalore 560003.

KERALA

Flanked to the west by the Indian Ocean and along the east by the Western Ghats, Kerala is well endowed with dense vegetation supporting a rich and varied fauna. Forest still covers 24 percent of the state and 5.9 percent is protected (5 national parks and 19 sanctuaries).

The weather throughout the year is pleasant with the monsoon arriving in late May and the wet period continuing up to September.

Eravikulam National Park

Established: 1978.
Location: In the Nilgiri hills of Kerala.
Size: The park covers 37 sq miles (96 sq km) of beautiful rolling grassy hills and forested valleys.
Best time to visit: November to April.
Animals & birds of the park: This area was earlier established as a sanctuary to protect the Nilgiri tahr (the only wild goat south of the Himalayas) of which it has the largest population (approximately 550 in 1988). There is a proposal to make Eravikulam, together with the nearby Chinnar Sanctuary, Kudakkadu and Pooyankutty forests, a single national park of 197 sq miles (510 sq km). This proposal together with Anamalai in Tamil Nadu and Peechi Vazhani-Chimony-Paramabikulam sanctuaries in Kerala would form a contiguous protected area of 775 sq miles (2,007 sq km). It also has the highest peak in South India: Anarmudi (8,853 ft/2,695 metres). The tahr are often seen near the bordering Rajamalai tea state. Elephant, tiger, leopard, dhole (wild dog), Nilgiri langur, lion-tailed macaque and giant squirrel are found.

Idikki Sanctuary

Established: 1976.
Location: Above the Idikki arch dam.
Size: 27 sq miles (70 sq km).
Best time to visit: November to May.
Animals & birds of the park: Sambar and elephant are often seen; tiger, sloth bear and gaur occasionally.

Neyyar Sanctuary

Established: 1958.
Location: At the Neyyar reservoir.
Size: 49 sq miles (128 sq km) with

the reservoir covering slightly more than 3.5 sq miles (9 sq km).
Best time to visit: Throughout the year.
Animals & birds of the park: Most of the sanctuary is wet tropical evergreen forest, with grasslands at higher altitudes. Agasthyadoodam at 6,203 ft (1,890 metres) is the highest point. A rich bird and insect life. Lion-tailed macaque, Nilgiri langur, gaur, sloth bear and wild boar are seen. Occasional tiger sightings. Tahr live on the grasslands.

Parambikulam Sanctuary

Established: 1962, expanded in 1973.
Location: The sanctuary stretches around the Parambikulam, Thunacadavu and Peruvaripallan reservoirs.
Size: The originally small area was expanded to 110 sq miles (285 sq km). A further extension to 156 sq miles (405 sq km) proposed to include good evergreen forest on the Nelliampathi Plateau to the Sholayar River to the north and small area connecting the Annamalai Sanctuary in Tamil Nadu.
Best time to visit: February to April.
Animals & birds of the park: The reservoirs have a good population of crocodile. Most of the area has dense deciduous forests and in one area old teak plantations. Gaur viewing is good, with the largest population in Kerala. Sambar, chital, lion-tailed macaque and a few tiger and leopard are seen.

Peechi Vazhani Sanctuary

Established: 1958.
Location: In the catchment area of the Peechi and Vazhani dams.
Size: 48 sq miles (125 sq km). Once the proposal to extend the connecting Chimony Sanctuary from 35 sq miles (90 sq km) to 50 sq miles (130 sq km) is enacted the Peechi Vazhani-Chimony-Parambikulam sanctuaries will form a large unit of 254 sq miles (660 sq km). The area will then be linked to the existing 324 sq miles (840 sq km) Annamalai Sanctuary in Tamil Nadu.
Best time to visit: September to May (open all year).
Animals & birds of the park: Mostly moist deciduous forest with interesting birds. The mammal life is poor due to the area's proximity to human habitation.

Peppara Sanctuary

Established: 1983.
Location: Hilly area in the Western Ghats.
Size: 20 sq miles (53 sq km).
Best time to visit: Throughout the year.
Animals & birds of the park: The hilly area with mixed forest cover has some fascinating birdlife. Elephants, sambar and lion-tailed macaque are seen, as well as the occasional leopard.

Periyar Tiger Reserve & National Park

Established: In 1934 as the Nellikkampetti Sanctuary, it was enlarged in 1950.
Location: Surrounding the Periyar Lake.
Size: It now extends over 300 sq miles (777 sq km) of which 135 sq miles (350 sq km) is national park. The lake covers 10 sq miles (26 sq km).
Best time to visit: September to May (open all year).
Animals & birds of the park: Most of the sanctuary is undulating. The elephant viewing is excellent, although only a few tuskers have avoided the poacher's gun. In 1983 there were 932 elephants in the sanctuary. Tiger sightings are rare. Woodland birds are abundant.

Silent Valley National Park

Established: In 1984 after a national campaign to protect the peninsula's last substantial area of primary tropical forest.
Location: In the Silent Valley of Kerala.
Size: 35 sq miles (90 sq km).
Best time to visit: September to March.
Animals & birds of the park: The park holds a valuable reserve of rare plants and herbs. A neighbouring area of 87 sq miles (225 sq km) ranging from 980 to 5,000 ft (300–1,525 metres) has been proposed as the Karimpuzha Sanctuary. Elephant, lion-tailed macaque and tiger are among the animals seen.

Thatterkkad Bird Sanctuary

Established: In 1983 as Kerala's first bird sanctuary.
Location: On the land between the branches of the Periyar river.
Size: 10 sq miles (25 sq km).
Best time to visit: September to March.
Animals & birds of the park: Mostly moist deciduous forest. Many water and forest birds including rarities such as the Ceylon frogmouth and the rose-billed roller. Also, lion-tailed macaque and flying squirrel.

Wynad Sanctuary

Established: In 1973, although a game reserve since the 1920s.
Location: Bordering Nagarahole and Bandipur in Karnataka and Mudumalai in Tamil Nadu.
Size: 132 sq miles (344 sq km).
Best time to visit: December to April.
Animals & birds of the park: Rich birdlife in remarkable and varied forests. Elephant, chital, gaur, sambar and sloth bear are fairly common.

MADHYA PRADESH

The heart of India and the country's largest state. With the largest area still under forest and the largest number of protected areas. In fact, a third of India's forest is in Madhya Pradesh. It also has the country's largest national park (Sanjay). The state includes many geographical regions. To the north is the Indo-Gangetic plain. The central plateau with hill ranges interspersed with river valleys create an attractive landscape.

Most parks in Madhya Pradesh are closed from the onset of the southwest monsoon in early June until early November.

Achankmar Sanctuary

Established: 1975.
Location: A few miles to the northwest of Bilaspur.
Size: 212 sq miles (551 sq km).
Best time to visit: March to June.
Animals & birds of the park: The sal and bamboo forest has mouse deer, gaur and tigers are among the animals reported.

Bagdara Sanctuary

Established: 1978.
Location: Near the northwestern border with Uttar Pradesh.
Size: 184 sq miles (478 sq km).
Best time to visit: December to February.
Animals & birds of the park: The area of dry mixed scrub and deciduous forest has blackbuck, chinkara, wolf and leopard. Extremely hot summers up to 120˚F (49˚C).

Barnawapara Sanctuary

Established: 1976.
Location: Near the border with Orissa.
Size: 94 sq miles (244 sq km).
Best time to visit: January to June.
Animals & birds of the park: The sanctuary consists of mixed deciduous forest and it is still possible to travel for long distances through the forest along the state border. This sanctuary is a small part of the forest area. Leopard, sambar and chital are seen.

Bandhavgarh National Park

Established: Originally the private forest and preserve of the Maharaja of Rewa, who encouraged the establishment of a national park in 1968.
Location: Surrounding the Bandhavgarh fort south of the town of Satna.
Size: Recently expanded to 175 sq miles (450 sq km).
Best time to visit: February to June (the park is open from November 1 each year and closes for the monsoon early in June).
Animals & birds of the park: Undulating terrain with 22 hills of which the main one, rises 1,300 ft (400 metres) above its surroundings. Sal and mixed forest with bamboo brakes. Open grassland to the south where village land has been reclaimed. Excellent game viewing and birdlife. Tiger, leopard, gaur, chital, sambar, dhole, nilgai, wild boar, sloth bear and chinkara can be seen.

Bhairamgarh Sanctuary

Established: 1984.
Location: In Bastar District in south MP.
Best time to visit: February to May.
Animals & birds of the park: This sanctuary was primarily sanctioned to protect the three small groups of wild buffalo in peninsular India. Acts as buffer to Indravati National Park. Tiger, leopard, chital and sambar are seen. Mixed deciduous forest with a high percentage of teak.

Bori Sanctuary

Established: 1977.
Location: Part of the Mahadeo range which cuts across southwestern MP.
Size: 200 sq miles (520 sq km).
Best time to visit: October to June.
Animals & birds of the park: The mixed deciduous and bamboo forest affords good viewing but poor infrastructure at present.

Indravati National Park & Tiger Reserve

Established: 1978. Came under Project Tiger in 1983.
Location: The park is part of a vast forest belt that stretches across southern Maharashtra, northern Andhra Pradesh, Madhya Pradesh and Orissa. The Indravati river flows through the park.
Size: Core area of 485 sq miles (1,258 sq km) and buffer sanctuary of 594 sq miles (1,540 sq km) which includes the **Bhairamgarh Sanctuary** *(see above)*.
Best time to visit: late January to April.
Animals & birds of the park: The importance of this park cannot be underestimated. It holds perhaps the only viable population of wild buffalo in central India and is a possible alternative home for the swamp deer of Kanha. Most of the forest is mixed deciduous with teak and large areas of bamboo. Also open grassland with large groups of chital etc. Other animals seen include sambar, nilgai, chousingha, chinkara, blackbuck, gaur, sloth bear, wild boar, leopard, wolf, hyena and jackal. Very hot summers of up to 120˚F (49˚C).

Kanger Ghati National Park

Established: 1982.
Size: 77 sq miles (200 sq km).
Best time to visit: February to June.
Animals & birds of the park: Moist deciduous forest with chausingha, leopard and wolf.

Kanha National Park

Established: First declared as a small sanctuary in 1933 and then national park from 1855.
Location: In the Banjar and Halon valleys 5 hours (by road) from Jabalpur.
Size: The area under Project Tiger is now 250 sq miles (650 sq km) of which 362 sq miles (940 sq km) is the core area..
Best time to visit: February to June (closed July–November).
Animals & birds of the park: Considered by some to be India's greatest national park, the area is certainly an excellent place to see many species in their natural habitat.

One of India's great conservation success stories is from Kanha where the barasingha (swamp deer) population has increased from about 66 in the late 1960s to over 450 by 1985. Attractive forest with bamboo brakes. Grassy plateaus and meadows in the valleys.

Karera Great Indian Bustard Sanctuary

Established: 1981.
Location: Near the town of Karera in Shivpuri District.
Size: 78 sq miles (202 sq km)
Best time to visit: Throughout the year.
Animals & birds of the park: Much of the sanctuary is still used by the villagers for seasonal grazing. Jheel

(small lake) with excellent water birds including flamingoes. Bustard best seen April–June. Mammals include wolf, fox, blackbuck and Chinkara.

National Chambal Sanctuary

Established: 1978.
Location: In the Chambal river valley across three states (Rajasthan, UP and MP).
Size: Total of 1,503 sq miles (3,900 sq km).
Best time to visit: November to March.
Animals & birds of the park: Formed to protect the **gharial** and other freshwater reptiles. The Chambal river forms the border between Rajasthan and MP and then UP and MP states. The sanctuary follows both banks of the river and includes the many dramatic ravines formed by erosion.

Madhav National Park (Shivpuri)

Established: Previously the hunting preserve of the Scindia family (Maharajas of Gwalior), it was declared a national park in 1959.
Size: It currently covers 60 sq miles (156 sq km) but a plan to extend it to 130 sq miles (337 sq km) has been proposed.
Best time to visit: October to April.
Animals & birds of the park: The park lies in low hills with dry deciduous forest and scrub. There is a large perennial lake. Some of the largest tigers recorded were shot in those forests, which have a good network of roads. It's possible to see Nilgai, chinkara, chital, chausingha, sambar, wild boar and some blackbuck, as well as a few tigers and leopards.

Pachmarhi Sanctuary

Established: 1977.
Location: Includes the hills and valleys of Mahadeo range of the Satpura hills around the attractive resort town of Pachmarhi.
Size: Covers 177 sq miles (460 sq km).
Best time to visit: April to June and October to December.
Animals & birds of the park: The dry deciduous forest of teak and sal has some leopard, blackbuck, sambar and nilgai.

Panna National Park

Established: Previously a hunting reserve of the Panna family, the area was declared a national park in 1981.
Location: Encompassing the forest divided by the Ken river flowing north to join the Yamuna.
Size: 209 sq miles (543 sq km).
Best time to visit: January to May.
Animals & birds of the park: Tiger, sloth bear, wolf, chital, chinkara and sambar are seen.

Panpatha Sanctuary

Established: 1983.
Location: Close to Bandhavgarh National Park
Size: 95 sq miles (246 sq km).
Best time to visit: March to June.
Animals & birds of the park: Mixed deciduous forest with sal and bamboo. With many of the same species as in Bandhavgarh although the terrain is less undulating. Tiger, chital and sambar are seen.

Pench National Park & Sanctuary

Established: 1977.
Location: In southern MP.
Size: Covering an area of 115 sq miles (300 sq km) and 173 sq miles (450 sq km) respectively. The park runs with the Pench National Park in Maharashtra to give a total area of almost 385 sq miles (1,000 sq km).
Best time to visit: March to June.
Animals & birds of the park: The forest is largely teak with some areas of mixed deciduous forest. Tiger, leopard, sloth bear, chinkara and chausingha are seen.

Sanjay National Park & Sanctuary

Established: The sanctuary was established in 1975 and expanded into a national park in 1981.
Size: The sanctuary with an area of 140 sq miles (365 sq km) was previously known as Dubari. It was then expanded as a national park to cover 747 sq miles (1,935 sq km).
Best time to visit: February to may.
Animals & birds of the park: The forest is largely sal with an attractive river flowing through.Tiger, leopard, chital, sambar, nilgai wild boar, and much birdlife, are seen.

Satpura National Park

Established: 1083.
Location: Adjacent to Pachmarhi Sanctuary in the Satpura Hills.
Size: 203 sq miles (525 sq km).
Best time to visit: January to June.
Animals & birds of the park: The park is hilly, with the highest point at 4,437 ft (1,352 metres).The forest is mixed deciduous with sal and teak. Tiger, leopard, gaur, chital and sambar are seen.

Son Gharial Sanctuary

Established: 1983.
Location: Along the banks of the Son river.
Size: 80 sq miles (207 sq km).
Best time to visit: November to April.
Animals & birds of the park: Gharial and few other animals.

Van Vihar National Park

Established: In 1979 to form the nucleus of an extensive zoological park.
Location: Near Bhopal.
Animals & birds of the park: Sanctioned to form the nucleus of an extensive zoological park. The existing area consists of dry mixed deciduous forest and has an exciting range of animals.

Among the other sanctuaries in Madhya Pradesh are: **Badalkhol** (Raigarh District), **Gandhi Sagar** (Mandsaur District), **Ghatigaon** (Gwalior District), **Gomradha** (Raigarh District), **Ken Gharial** (Panna and Chatarpur Districts), **Kharmore** (Dhar District), **Kheoni** (Dewas and Sehore District), **Narsingarh** (Rajarah District), **Nauradhehii** (Sagar District), **Palpur Kund** (Morena District), **Pamed** (Bastar District), **Phen** (Mandla District), **Ratadani** (Raisen District), **Sailana** (Ratlam District), **Semarsot** (Surguja District), **Udanti** (Raipur District).

There is also a small fossil National Park, 8 miles (13 km) from Shahpura in Mandla District.

For information on any of the above areas contact the Chief Wildlife Warden, E-2/0 Mahavir Nagar, Bhopal, MP.

MAHARASHTRA

The widely differing habitats of Maharashtra range from the coast, inland to the rich Western Ghats and the teak, sal, bamboo and scrub areas of the Deccan. Of the 2,000 plus species and subspecies of birds in India, the state has records of 540, of which 442 are found in the area of Mumbai and the Western Ghats.

Borivali National Park

(Also known as Sanjay National Park – there is another park of the same name in MP.)
Established: 1974.
Location: Only 21 miles (35 km) north of central Mumbai.
Size: Now covering 36 sq miles (94 sq km).
Best time to visit: October to May.
Animals & birds of the park: The area includes a Safari Park and a tourist-oriented deer park. The park has two small lakes and the Kanheri caves. A large variety of birds.

Kinwat Sanctuary

Established: 1971.
Location: Near the town of Kinwat in Yavatmal District.
Size: 84 sq miles (218 sq km).
Best time to visit: February to June (June max temp 114˚F/45˚C).
Animals & birds of the park: Mostly dry teak forest. Although tiger, leopard, chital, chinkara and blackbuck (in the open scrub) are found, game viewing is poor and there is no infrastructure.

Melghat Tiger Reserve

Established: In 1973 as one of the initial Project Tiger reserves.
Location: In the Gaurilagarh Hills.
Size: A total area of 605 sq miles (1,571 sq km), of which 120 sq miles (311 sq km) form the core area.
Best time to visit: January to June.
Animals & birds of the park: Largely dry teak forest in the Gaurilagarh Hills. The main ridge rises to over 3,280 ft (1,000 metres). The Tapi river flows along the northern border. The forest is dense and game viewing is poor. Wildlife populations are on the increase. Tiger, leopard and wild dog are the main predators. Sambar, barking deer, chinkara, chital, nilgai, wild boar and gaur are all found.

Nagzira Sanctuary

Established: 1969.
Location: Near the Nawegaon national park.
Size: 59 sq miles (153 sq km).
Best time to visit: October to June.
Animals & birds of the park: Tiger, leopard, sloth bear, chousingha and chital are present.

Nawegaon National Park

Established: 1975.
Location: In the Nishani range, it includes two lakes: Nawegaon and Itiadoh.
Size: 52 sq miles (134 sq km).
Best time to visit: October to June (June max temp 114˚F/46˚C).
Animals & birds of the park: Mixed deciduous forest. The highest point is Ambajhar peak. A good system of roads. Large variety of birds. Tiger and leopard are rarely spotted. A few gaur, chousingha, nilgai, sambar and chital are seen.

Pench National Park

Location: In the Satpura Hills due north of Nagpur.
Size: 100 sq miles (260 sq km). (The protected area continues across the border into MP where an additional 270 sq miles (700 sq km) has sanctuary status.)
Best time to visit: November to June.
Animals & birds of the park: The area is cut north–south by the Pench river. Most of the park is mixed deciduous forest with open meadows in some of the valleys. Most areas are accessible. Tiger, a few leopards, chital, sambar and gaur are seen.

Toroba National Park

Established: Founded as a reserve in 1935, the area was declared a national park in 1955.
Location: Near the town of Chandrapur in West Chanda Division.
Best time to visit: October to June (June max temp 115˚F/46˚C).
Animals & birds of the park: The area became part of Maharashtra with the reorganisation of states but retained its status as a park. The focal point is a lake in the midst of mixed deciduous forest and rolling hills. Leopards are sighted more often than the few tigers that come to the area. Wild boar are numerous; chital, sambar, nilgai and gaur are also seen.

The other sanctuaries in Maharashtra include **Dor** (Nagpur District), **Devlagaon Dehekuri Blackbuck Sanctuary** (Ahmednagar District), **Dhakua Kolkaz** (Amravati District), **Great Indian Bustard Sanctuary** (Solapur District), **Radhanagri** (Kolhapur District), **Tansa** (Thane District) and **Yawal** (Jalgaon District).

For further information on these and other protected areas contact The Chief Wildlife Warden, Pune, Maharashtra.

MANIPUR

There are two national parks in the small mountainous state on the Burma border. The area was a former princely state linked by treaty to India in 1825. Sixty percent of the population are members of a Tibeto-Burmese people, the Meitheis. Access to the area is restricted and for foreign tourists extremely difficult.

Keibul Lamjao National Park

Established: Previously an area for waterfowl shoots, the area became a sanctuary in 1954 when a few surviving sangai or brow-antlered deer were reported.

Location: The park is located at the southeastern end of the Logtak Lake 20 miles (32 km) south of Imphal.
Size: The park now covers 14 sq miles (36 sq km).
Best time to visit: December to May.
Animals & birds of the park: The sangai is perhaps one of the most endangered and most localised mammals in the world. They live on only 2.5 sq miles (6 sq km) of floating vegetation know as *phumdi*.

There are possibly more brow-antlered deer in captivity (about 50) than in the wild – the largest group is in Delhi zoo. The deer is distinguished by its gracefully curved antlers – the brow tines sweep forward and beams backwards in an almost continuous curve. Three hills – Pabot, Toya and Chingiao – provide vantage points over the *phumdi* and during the monsoon the deer move onto the higher and harder ground. Other animals seen include hog deer, fishing cat and wild boar.

Sirohi National Park

Established: 1982.
Location: Covers a small forest near the Burma border.
Animals & birds of the park: Tigers are reported. Rich birdlife including pheasants.

MEGHALAYA

"The abode of clouds" previously constituted the hill districts of Assam south of the Brahmaputra. Three Adivasi groups live in the hill areas of the same name: Garos, Khasis and Jaintias. The capital, Shillong, was previously the capital of Assam. The world's wettest place is Cheera Punji to the southwest of Shillong which receives about 500 inches (1,270 cm) of rain each year.

A third of the state is still forested, a fraction of which is reserve forest enjoying little protection. It is extraordinary that Meghalaya, with its rich animal and birdlife, extensive forest and untold insects has only two absurdly small sanctuaries. The state has a possible elephant population of 2,500 but none of its habitat is yet protected. A proposal for a 112 sq mile (290 sq km) sanctuary to be called Balphakram, with a buffer area of a further 115 sq miles (299 sq km) is still pending. Evergreen and moist deciduous forest with large tracks of scrub, grass and bamboo is representative of much of the state.

Within its well forested hills, steep gorges and rivers, tiger, leopard, gaur, wild buffalo, golden cat, clouded leopard, capped langur, Hoolock gibbon, leopard cat, black bear, serow and other animals have been recorded. Peacock pheasants are only one among the fascinating bird species seen.

Permission to enter Meghalaya is obtainable. Permits for Shillong are often granted along with permission to visit Manas and Kaziranga Parks and Guwahati (in Assam).

Nongkhyllem Sanctuary

Established: 1981.
Location: 40 miles (65 km) from Guwahiti.
Size: 11 sq miles (29 sq km).
Best time to visit: October to May.
Animals & birds of the park: The sal forest of the sanctuary contains a good range of species including binturong, clouded leopard, golden cat and leopard cat.

Siju Sanctuary

Established: 1979.
Location: Covers a small area near the town of Tura.
Size: 2 sq miles (5 sq km).
Best time to visit: December to March.
Animals & birds of the park: The forest is mixed everywhere, with some sal. Many birds and animals species are represented.

A biosphere reserve has been proposed at Nokrek east of Tura in the West Garo Hills.

MIZORAM

In this mountainous state bounded by Bangladesh on the west and Burma (Myanmar) to the south and east, there is at present only one wildlife protected area. Much of the state is forested and new sanctuaries need to be developed. Permission for tourists to enter the territory is hard to obtain.

Dampa Sanctuary

Established: 1976.
Location: At the northwestern tip of the Mizo Hills.
Best time to visit: November to March.
Animals & birds of the park: About 20 percent of the sanctuary is covered with bamboo while the rest is mostly semi-evergreen forest. The area is drained by the Dhaleswari river and its tributaries. Swamp deer are reported. Tiger, leopard, elephant and Hoolock gibbon are among the mammal species seen.

NAGALAND

To the east of Assam in the Naga hills is the small fascinating state of Nagaland, bounded by Burma to the east with the upper reaches of the Chindwin river beyond. Most of the area has a strong Adivasi culture and travel is restricted.

As with much of northeast India, the Naga hills have a distinctive wildlife and equally fascinating flora. Numerous species of orchid are unique to these hill areas. Most of Nagaland is covered by tropical evergreen forest while in the higher areas subtropical pine and temperate deciduous forest thrive.

Fakim Sanctuary

Established: 1983.
Location: This small sanctuary is in the eastern hills close to the Burma border.
Best time to visit: February to March.
Animals & birds of the park: The park rises to almost 9,850 ft

(3,000 metres) and receives high rainfall in June and July, making travel extremely difficult. Tiger is reported in the area. Hoolock gibbons are seen.

Itanki Sanctuary

Location: Near Kohima in the southwestern corner of the state bounded on the west by the Dhansiri river which also forms the state border with Assam.
Size: 78 sq miles (202 sq km).
Best time to visit: November to March.
Animals & birds of the park: Most of the sanctuary, covered with subtropical forest, is low lying – the highest point being only 2,216 ft (675 metres). Of the total estimated elephant population in Nagaland of above 250, almost 150 in four or five herds use this sanctuary and the adjacent area. The elephant migrate to/from the North Cachar Hills of Assam to the west.

Puliebedze Sanctuary

Established: 1979.
Location: On the edge of Kohima.
Size: 3.5 sq miles (9 sq km)
Best time to visit: November to March.
Animals & birds of the park: Tragopan and Kaleej pheasants are among the many fascinating hill and forest birds seen.

ORISSA

With Orissa's long coastline of offshore islands, lagoons (Chilka is India's largest salt-water lake), salt flats and deltas along the Bay of Bengal, it is possible to forget that inland, to the west, there are large areas of forested hills running into Madhya Pradesh and Andhra Pradesh. The varied habitats contain an equally wide-ranging bird and animal life. While the wildlife is rich and in many places exciting, few of Orissa's parks have infra-structure geared towards visitors. The parks are off the beaten track and few have transport for hire or facilities for food.

Baisipalli Wildlife Sanctuary

Established: 1981.
Location: In the Eastern Ghats in Puri District.
Size: 64 sq miles (166 sq km).
Best time to visit: December to February.
Animals & birds of the park: The sanctuary rises from almost sea level to 2,800 ft (855 metres). Apart from elephants and tigers, there are also sambar, mouse deer and fascinating range of birds.

Balukhand Sanctuary

Established: 1984.
Location: On the coast line near Puri.
Size: 28 sq miles (72 sq km).
Best time to visit: October to May.
Animals & birds of the park: The sanctuary protects the shoreline nesting grounds of the olive ridley and green sea turtle. On land are groups of blackbuck.

Bhitarkanika Sanctuary

Established: 1975.
Location: In the estuary of the Brahmani river.
Size: 250 sq miles (650 sq km).
Best time to visit: October to May.
Animals & birds of the park: This marine sanctuary has extensive birdlife, estuarine crocodiles and sea turtles.

Chilka Sanctuary

Established: 1973.
Location: At Chilka Lake including the surrounding shore and hinterland.
Size: 345 sq miles (900 sq km). The lagoon covers 425 sq miles (1,100 sq km) of shallow water separated from the Bay of Bengal by a narrow sand bar.
Best time to visit: December to March.
Animals & birds of the park: While chital and blackbuck are seen on the scrubby shoreline, it is the birdlife that makes the area important. The migratory birds arrive in early winter and stay till March. Also seen are resident shore birds and birds of prey. Dolphins are occasionally sighted near the mouth of the lagoon.

Nandankanan Sanctuary & Biological Park

Established: 1979.
Location: Near Bhubaneshwar.
Size: Small – in fact a modern zoological park.
Best time to visit: November to February (open throughout the year).
Animals & birds of the park: The species shown in their various habitats give a good introduction to the range and diversity of India's fauna.

Satkosia Gorge Sanctuary

Established: 1976.
Location: Along the 14-mile (22-km) gorge as the Mahanadi river cuts through the Eastern Ghats.
Size: The total sanctuary area is 306 sq miles (795 sq km).
Best time to visit: November to May.
Animals & birds of the park: Although established to protect crocodile habitat and support projects for the gharial, the surrounding forest also have leopard, the occasional tiger, wolf and sambar.

Simlipal National Park Tiger Reserve & Sanctuary

Established: The area was declared a sanctuary in 1957 and its core became a national park in 1980.
Location: In the Mayurbhanj District in north Orissa.
Size: The total area is 1,059 sq miles (2,750 sq km) of which the park is only 117 sq miles (303 sq km).
Best time to visit: February to June.
Animals & birds of the park: Once the hunting preserve of the maha-rajas of Mayurbhanj, the sanctuary covers some of the most attractive forests in India. One of the first sanctuaries under Project Tiger.

The park has 12 rivers cutting across it and on many there are waterfalls. The largely sal forest is broken up by clearings and green grasslands along the rivers. Many of the rivers have mugger crocodiles. Mammals include tiger, elephant, gaur, leopard, chital, mouse deer,

sambar and pangolin. The birdlife is extensive and varied, with the singing hill myna being among the more noticeable.

Ushakothi Sanctuary

Established: 1962.
Location: The sanctuary is to the east of the Hirakud Reservoir in Sambalpur District.
Best time to visit: October to May.
Animals & birds of the park: The area covered with a mixed deciduous forest drains into the Hirakud reservoir. Tiger, elephant, sambar, chital and gaur are found but are usually seen only at night.

Among the many other excellent sanctuaries in Orissa are **Chandaka Dampadu** (Puri District), **Debrigarh** (Sambalpur District), **Hadgarh** (Mayurbhanj District), **Khalasoni** (Sambalpur District), **Kotgarh** (Phulbani District), **Kuldiha** (Baleshwar District) and **Sunabeda** (Kalahandi District).

Further information is available from the Chief Wildlife Warden in Bhubaneshwar, Government of Orissa Tourist Office, Tourist Bungalow, Bhubaneshwar 751006.

PUNJAB

Between the Himalayan foothills and the desert of Rajasthan lies the fertile land of five rivers – Punjab. The state is now highly developed with extensive irrigation projects to allow intensive agriculture. A consequence of this is that there are few wilderness areas left. The declared reserves are small, with the exception of the **Abohar Sanctuary** (73 sq miles/188 sq km) which, being in Firozpur District, close to the border with Pakistan, cannot be visited.

The other sanctuaries are **Bir Bunar Heri Sanctuary** (3 sq miles/8 sq km), Patiala District **Bir Gurdialpura Sanctuary** (0.4 sq mile/1 sq km), Patiala District **Bir Motibagh Sanctuary** (2 sq miles/5 sq km), Patiala District **Harike Lake Sanctuary** (16 sq miles/41 sq km) Amritsar District

Information on all the above can be obtained from the Chief Wildlife Warden, SCD 2463-64, Sector 22-C, Chandigarh.

RAJASTHAN

Situated in the northwest of India. The Aravalli Hills form a line across the state and about 60 percent of the state lies northwest of this line. Over 50 percent of the state receives a mean annual rainfall of less than 15 inches (400 mm).

While the western part of the state is mostly desert, the eastern half is classified as semi-arid. Much of the flora is scrub jungle and towards the Pakistan border several plant species are endemic to the area. Trees are scarce, found only sparingly in the Aravallis and in eastern part of Rajasthan. The Thar desert is an extension of the desert belt stretching from the Sahara in North Africa, through the Middle East and Pakistan to India.

Bheensrodgarh Sanctuary

Established: 1983.
Location: In Chittor District.
Size: 88 sq miles (229 sq km).
Best time to visit: October to May.
Animals & birds of the park: Scrub and dry deciduous forest. The area has been increasingly threatened by illegal grazing and collecting of fuel wood. Despite this, leopard are seen in the area along with chinkara, sloth bear and other mammals.

Darrah Sanctuary

Established: 1955 – previously the hunting preserve of Kota state.
Location: In Kota District.
Size: 102 sq miles (266 sq km).
Best time to visit: February to May.
Animals & birds of the park: The former Maharao kept an interesting photographic record of the tigers in the area, part of which is still on display. Dry deciduous forest (mostly *Anogeissus penduia).* The animals include sloth bear, chinkara and leopard. Despite the disturbance from local villages it is still worth visiting.

Desert National Park

Established: 1980.
Location: 20 miles (32 km) from the fortress town of Jaisalmer.
Size: Covers a large area of 1,220 sq miles (3,162 sq km).
Best time to visit: September to March (summer temperature. exceeds 122˚F/50˚C).
Animals & birds of the park: Although known as a park, much of the area in fact has only sanctuary status but the area as a whole has its own distinct wildlife. Very little of the area is a Sahara type of desert with rolling sand dunes: much of the land is covered with patchy scrub and even trees and flowers. The shrubs have adapted themselves to the harsh climate and although many are leafless, they provide shelter and shade for many animals. There are many Bishnoi villages in the sanctuary area and environs. Blackbuck and chinkara are often observed nearby. Other animals include wolf, desert fox, hare and desert cat. Many birds of prey such as the tawny eagle, short-toed eagle, spotted eagle, kestrel and laggar falcon are seen. Other birds inhabiting the park sandgrouse (particularly in the early morning), grey partridge and approximately 350 great Indian bustards.

Jaisammand Sanctuary

Established: 1957.
Location: Beside the large man-made (62 sq miles/160 sq km) lake from which it takes its name.
Size: 20 sq miles (52 sq km).
Best time to visit: November to June.
Animals & birds of the park: The lake was built by Maharana Jai Singh in the 16th century and the surrounding hills are dotted with chatris, a marble palace and other buildings. Some of the islands are inhabited by Bhils – a people of southern Rajasthan. The sanctuary is small but holds chital, chinkara, wild boar and a few leopard. Many crocodiles feed on a large population of fish.

Keoladeo Ghana National Park

Established: Originally protected for the occasional duck shoot, the area became a sanctuary in the 1950s and a national park in 1983.
Location: On the swampy area created by damming the monsoon flood waters near the town of Bharatpur on the Agra–Jaipur highway.
Size: 11 sq miles (29 sq km).
Best time to visit: Open throughout the year; breeding season: August to October; migrants: October to late February.
Animals & birds of the park: Previously known as the Bharatpur Bird Sanctuary, this magnificent park is one of the world's greatest and most important heronries. About a third of the park is a shallow, fresh-water marsh formed by retaining water after the monsoons. The dry areas are mostly scrub, thorn and mixed deciduous forest. Over 12,000 nests produce over 30,000 chicks. Although mainly famous for its water birds, many other species, including many raptors, are also found here. Mammals include sambar, blackbuck, chital, nilgai, fishing cat, jungle cat, otter and mongoose.

Kumbalgarh Sanctuary

Location: Near the Kumbalgarh fort in Udaipur District in the rugged Aravalli hills.
Size: 222 sq miles (575 sq km).
Best time to visit: March to May (hot days), September to November.
Animals & birds of the park: This large sanctuary in the only area is India where the highly endangered wolf is successfully breeding. Other animals here include leopard, sloth bear, chinkara, chousingha, ratel and flying squirrel. The Kumbalgarh fort to the east is one of the largest and most impressive in Rajasthan, with 365 temples within its walls. The sanctuary is dry and apparently barren for much of the year but comes alive during the monsoon and in October when the deciduous trees change colour before shedding their leaves.

Mount Abu Sanctuary

Established: 1960.
Location: In the forested hills northeast of Mount Abu.
Size: 110 sq miles (285 sq km).
Best time to visit: March to June.
Animals & birds of the park: The sanctuary includes Guru Shikhar which at 4,895 ft (1,492 metres) is the highest point in the Aravalli Hills. Animals include leopard, chinkara and, in the lower areas, sloth bear, sambar and wild boar. Among the interesting birds is the grey jungle fowl.

National Chambal Sanctuary

Established: 1983.
Location: Along the Chambal river from Rana Pratap Sagar to the southwest of Kota to its confluence with the Jamuna.
Size: 211 sq miles (549 sq km).
Best time to visit: October to March.
Animals & birds of the park: The area has sanctuary status to protect the gharial crocodile. South-east of Sawai Madhopur the Chambal joins the Parbati river which forms the border with Madhya Pradesh. The Madhya Pradesh bank is also a sanctuary. Blackbuck, caracal, chinkara and wolf are among the many animals that enjoy protection here. In the winter, gharial are often seen basking on the sand banks.

Ranthambhore National Park

Established: As a sanctuary in 1955; it was later given national park status and came under Project Tiger.
Location: Around the Ranthambhore fort at the junction of the Aravalli and Vindhya ranges.
Size: 150 sq miles (390 sq km).
Best time to visit: October to April.
Animals & birds of the park: Although the smallest of the Project Tiger reserves, Ranthambhore has an impressive range of animal species including sambar, chital, nilgai, chinkara, wild boar, sloth bear, hyena, jackal, leopard and tiger. Since coming under the Project Tiger management, these arid hills have been restored to their full dynamism. Artificial lakes now blend with the forested hills and form an integral part of the park. Excellent birdlife with the crested serpent eagle among the many birds of prey to be seen. Many water birds are seen on the lakes.

A thousand year old fort rises 700 ft (214 metres) above the park. A private trust, The Ranthambhore Foundation, carries out a variety of projects in the villages and buffer areas of the park. These projects involve the restoration of degraded land, alternative fuel and energy projects, rural health and creation of fuel wood and grazing areas outside the park so villagers will not need to enter it illegally.

Sariska National Park, Tiger Reserve & Sanctuary

Established: Originally the shooting area of the Alwar ruling family, Sariska became a sanctuary in 1958. The sanctuary came under Project Tiger in 1979 and became a national park in 1982.
Location: At Kankwari fort near Alwar on the Delhi–Jaipur highway.
Size: Core area (national park) with an area of 191 sq miles (495 sq km).
Best time to visit: November to June. Very dry summers make June a good month for game-viewing around the few water holes, although it gets very hot.
Animals & birds of the park: Most of Sariska is hilly with a wide valley from the gate to Thana Gazi. The park also includes the 9th- and 10th-century ruins of Shiva temples and the Kankwari fort. It has a good network of roads. Animals here include leopard, wild dog (first sighted in 1986), nilgai, chital, chausingha, chinkara, ratel and tiger.

Sitamata Sanctuary

Established: 1979.
Location: In southern Rajasthan in Udaipur District.
Size: 163 sq miles (423 sq km).
Best time to visit: April to June.
Animals & birds of the park: Dry

deciduous with bamboo. The flying squirrel is more often seen here than in most other sanctuaries. Other species seen include leopard, caracal, chausingha, pangolin, sambar, wild boar and **chinkara.**

Tal Chapper Sanctuary

Size: 27 sq miles (70 sq km).
Best time to visit: April and October.
Animals & birds of the park: This small sanctuary has a large blackbuck population. Chinkara, partridge and sandgrouse are common; the desert fox and cat less so. Mostly thorn scrub with high summer temperatures.

Other sanctuaries in Rajasthan include **Jamia Ramgarh** (Jaipur District), **Jawahar Sagar** (Kota, Bundi District), **Kaila Devi** (Sawai Madhopur District), **Nahargarh** (Jaipur District), **Phulwari** (Udaipur District), **Ramgarh** (Bundi District), **Shergarh** (Kota District), **Sonkhaliya Closed Area Bustard Sanctuary** (Ajmer District), **Sorson Closed Area Bustard Sanctuary** (Kota District), **Todgarh Road** (Ajmer, Udaipur and Pali Districts) and **Vanvihar** (Dholpur District).

Information on all these areas can be obtained from: The Chief Wildlife Warden's office, Van Bhawan, Bhagwan Das Road, Jaipur.

SIKKIM

This small, strategically important state is surrounded on three sides: by Nepal to the west, Tibet to the north and northeast and Bhutan to the east. The state is only 2,818 sq miles (7,300 sq km) in area and its only national park occupies 10 percent of this. Compressed into the 70 miles (112 km) from north to south is an extraordinary range of habitats and diversity of flora. Over a thousand orchids are recorded from Sikkim, and near Gangtok (the capital) is an orchid sanctuary with 250 species which flower prior to the monsoon (in May and June), while others bloom during December and January.

Travel in much of Sikkim is restricted. Permits to visit the western and southern region are obtainable from any Indian Embassy or High Commission abroad or from the Ministry of Home Affairs (Foreigner's Wing), Lok Nayak Bhawan, Khan Market, New Delhi 110003.

Kangchendzonga National Park

Established: 1977.
Location: In east Sikkim comprising the mountainous regions of the Kangchendzonga Himalayas.
Size: 328 sq miles (850 sq km).
Best time to visit: April to May and August to October.
Animals & birds of the park: Wet temperate forests at the lower levels, rising to the bare rock, ice and snow of the peaks. The park is bounded by Nepal on the west with some of the world's highest mountains straddling the border: Tent Peak, Nepal Peak, Kabur North, Kabur South and, of course, Kangchendzonga itself (28,179 ft/8,589 metres). To the north is the Zemu glacier flowing into the Zemu river and then the Tista. The park has an impressive range of animals and birds: leopard, clouded leopard, tahr, musk deer, bharal, serow, snow leopard, red panda and binturong.

Other sanctuaries, developed in the mid-1980s, are **Fambung Kho** (6 sq miles/15 sq km), **Kyongnosla Alpine Sanctuary** (1.5 sq miles/4 sq km) and the **Singba Rhododendron Sanctuary** established to protect the natural flora.

TAMIL NADU

Most of Tamil Nadu's park are little known, even though their range is extraordinary – mixed deciduous forests of the Western Ghats, through the hot, dry plains, to the coastal and marine parks. Two biosphere reserves are proposed: one at the Gulf of Mannar and other in the Nilgiris. Most of Tamil Nadu receives both the monsoons, and the two rainy seasons severely limit game-viewing. November to February are pleasant months to travel through the state.

Annamalai Wildlife Sanctuary

Established: 1983.
Location: On the northern end of the Cardamom Hills abutting Kerala on its western border.
Size: 368 sq miles (955 sq km).
Best time to visit: February to June.
Animals & birds of the park: The focal point is known as Top Slip. Rich, mixed deciduous forest with large rosewood and teak trees. The main attractions are the lion-tailed macaque and Nilgiri langur for which the park offers a secure home; both of these tend to stay in the evergreen sholas. Gaur can be seen near the Srichalippallam river. Elephant, chital, sambar, mouse deer and barking deer are found here, as is extensive birdlife.

Kalakad Sanctuary

Established: In 1938 and expanded later.
Size: 86 sq miles (224 sq km) with a core area of 31 sq miles (81 sq km).
Best time to visit: January to March (rainy season is from October to December).
Animals & birds of the park: The mixed semi-evergreen forest contains a wide range of animals, including elephant, macaque and good birdlife.

Mudumalai Sanctuary

Established: 1938.
Location: On the Mysore–Ootacamund road adjacent to the Bandipur National Park in Karnataka.
Size: 124 sq miles (322 sq km).
Best time to visit: March to June, September and October.
Animals & birds of the park: This sanctuary with mixed deciduous forests is bounded to the north by Bandipur National Park in Karnataka and to the west by the Wynad Sanctuary in Kerala. Good game-viewing and facilities.

Mundanthurai Sanctuary

Established: 1962.
Location: In a large area containing pockets of virgin rainforest in Tiruneveli District.
Size: 219 sq miles (567 sq km).
Best time to visit: September to December.
Animals & birds of the park: This large sanctuary is excellent for viewing examples of India's primates. The area receives almost 120 inches (300 cm) of rain and there are still pockets of virgin rainforest. The bonnet macaque and common langur are found throughout the sanctuary; the Nilgiri langur at Tarucvattampaarai and the lion-tailed macaque near the top of Valaiyar Hill. Tiger, leopard, sloth bear, sambar and chital are also seen.

Point Calimere Sanctuary

Established: 1967.
Location: On the shore and hinterland surrounding a saline lagoon near Point Calimere at the tip of the Indian peninsula.
Size: 6.5 sq miles (17 sq km).
Best time to visit: November to January.
Animals & birds of the park: Part of the area is tidal swamp. Dolphins are occasionally seen in the lagoon. Also, there are numerous shore birds and waders, large flocks of both greater and lesser flamingoes. Blackbuck, chital, feral pig and bonnet macaques are among the land mammals seen.

Vedanthangal Sanctuary

Established: Protected for over 200 years, and first legislated protection in 1788 when shooting was prohibited.
Location: 50 miles (80 km) from Chennai.
Best time to visit: October to February.
Animals & birds of the park: The sanctuary is small and consists of a grove of trees growing in and around the village tank. There are a number of resident breeding water birds and many migrants.

There is a small preserve of only 1 sq mile (2.6 sq km) at **Guindy** in Chennai which also has a zoo and the Chennai Snake Park. A Marine National Park in the Gulf of Mannar is a proposed biosphere reserve. Other sanctuaries are **Karikili** (Chengalpattu District), **Nilgiri Tahr Sanctuary**, Pulicat (Chengalpattu District) and **Vettangudi** (Ramanathapuram District).

For further information contact The Chief Wildlife Warden, 50 IVth Main Road, Gandhi Nagar, Chennai 600020.

TRIPURA

This small state 4,050 sq miles (10,490 sq km) with less than 3 million people is surrounded on three sides by Bangladesh and to the east with Assam and Mizoram. The state capital, Agartala, is located close to the Bangladesh border. Much of the state is well cultivated and subject to Juma or "slash and burn" farming. Special permission is no longer required from the central government for foreign nationals to visit the area, but visitors do need to register upon arrival and departure at Agartala airport.

Tripura's forests resemble those in Burma and Malaya, and are home to elephant, tiger, gaur, serow, lesser cats and numerous primates.

Charilam Sanctuary

Size: 5 sq miles (13 sq km).
Location: A few miles south of Agartala.

Trishna Sanctuary

Established: 1989
Size: 20 sq miles (52 sq km).

Gomti or Central Catchment Sanctuary

Established: Area with previous sanctuary status, awaiting decision on enlargement.

UTTAR PRADESH

This huge state ranges from the High Himalayas to the Gangetic Plain. It is densely populated, with a population larger than any European country, but it nevertheless has an important and vast range of wilderness areas. The Himalayan region has many peaks between 21,000 and 26,000 ft (6,400–8,000 metres) high. The central part is a vast alluvial and extremely fertile plain formed by the Ganga and its many tributaries; the Chambal, the Yamuna, the Ramganga and others.

Some of the sanctuaries have been established for specific species such as the **gharial**, while others are more general, such as Corbett and Dudhwa.

Corbett National Park

Established: In 1936 as the Hailey National Park, following the advice of the hunter-naturalist Jim Corbett.
Location: In the *terai* (riverine grassland) region with the undulating Siwalik foothills of the Himalayas with the Ramganga river flowing through it from east to west.
Size: The park in 1986 covered 200 sq miles (520 sq km) and a proposed extension of up to 230 sq miles (600 sq km) is under consideration.
Best time to visit: February to May. Closed from mid-June to mid-November during the monsoon season.
Animals & birds of the park: The diversity of the wildlife and its location in relation to the major cities of northern India have made it perhaps the most famous park in the region. The many pools of the Ramganga have both mugger and gharial. The river also holds mahaseer and other sporting fish. The park is closed during the monsoon until mid-November.

Chilla Sanctuary

Established: 1977.
Location: On the east bank of the Ganga river near Haridwar.
Size: 96 sq miles (249 sq km).

Best time to visit: November to mid-June.
Animals & birds of the park: The area has traditionally been known for elephants that migrate through it. A few tiger, bear and small cats are seen along with interesting birds.

Dudhwa National Park

Established: Founded as a sanctuary in 1968 and upgraded to a national park in 1977.
Location: Along the Indo-Nepal border in Kheri District.
Size: 189 sq miles (490 sq km).
Best time to visit: December to June.
Animals & birds of the park: These *terai* jungle were long protected thanks to the efforts of "Billy" Arjan Singh whose farm, Tiger Haven, forms part of the southern boundary. Best known for the leopard and tiger re-introduction projects Arjan Singh carried out with the support of the WWF and the Government of India during the 1970s. The original sanctuary was set up to protect a large population of swamp deer; other species include tiger, leopard, sloth bear, chital and hog deer. Rhinoceros were introduced from Assam in 1985. An excellent range of birds is seen.

Govind Sanctuary

Established: 1955.
Location: In the upper Tons valley bordering Himachal Pradesh.
Size: 368 sq miles (953 sq km).
Best time to visit: May to October.
Animals & birds of the park: The sanctuary includes some interesting mountains including Swarg Pohini, Black Peak and Bandarpunch. The Har-Ki-dun valley forms part of the sanctuary. Animals found here include musk deer, brown bear, bharal, serow and leopard.

Kaimur Sanctuary

Established: 1982.
Location: On the outskirts of Robertsganj near Varanasi.
Size: 193 sq miles (500 sq km).
Best time to visit: October to February.
Animals & birds of the park: The dry, mixed forest and scrub of the sanctuary support leopard, black buck and chinkara. Wolf are occasionally glimpsed in the area.

Katerniaghat Sanctuary

Established: 1976.
Location: At the Nepal border at Katerniaghat.
Size: 154.5 sq miles (400 sq km).
Best time to visit: November to March.
Animals & birds of the park: This little-known *terai* sanctuary has a few swamp deer, tiger, gharial and mugger crocodile along the Girwa river and its tributaries.

Kedarnath Sanctuary

Established: 1972.
Location: In the Garhwal Himalayas surrounding the holy Kedarnath temple.
Size: 373 sq miles (967 sq km).
Best time to visit: Late April to October.
Animals & birds of the park: Leopard, tahr, serow and musk deer are among the animals seen. A detailed musk deer study funded by the WWF was undertaken here between 1978 to 1980. Kaleej and monal pheasants are among the many birds that can be observed here.

Kishanpur Sanctuary

Established: 1872.
Location: Near the Nepal border west of Dudhwa in Kheri District.
Size: 77 sq miles (200 sq km).
Best time to visit: February to May.
Animals & birds of the park: Forest and open meadows in the *terai* similar to Dudhwa. Tiger, a few swamp deer, leopard, sambar and hog deer are seen.

Nanda Devi National Park

Established: 1980.
Location: In the vicinity of Nanda Devi Peak, India's second highest mountain.
Size: 243 sq miles (630 sq km).
Best time to visit: April to October.
Animals & birds of the park: The natural sanctuary was first entered in 1934 by the remarkable British mountaineers, Eric Shipton and Bill Tilman. Apart from Tilman's successful attempt on Nanda Devi in 1936, the area remained virtually undisturbed until the 1950s, when a spate of climbing and trekking expeditions into the area began. Since 1980, access to the area has been restricted and climbing expeditions must first get permission from the Indian Mountaineering Federation (Benito Juarez Marg, New Delhi). When Shipton first entered the sanctuary he gazed on herds of bharal and goral – the numbers are now reduced but they can still be seen. Other animals hereinclude musk deer, serow and, possibly, snow leopard. The area is a proposed biosphere reserve.

National Chambal Sanctuary

Established: 1979.
Location: In the Chambal Valley, along the Rajasthan, MP and UP border.
Size: Part of a large area (1,503 sq miles/3,900 sq km) administered jointly by Rajasthan, MP and UP.
Best time to visit: November to March.
Animals & birds of the park: Gharial crocodiles and a few other animals and reptiles are found here.

Rajaji Sanctuary

Established: 1966.
Location: At the edge of the Dehra Dun valley.
Size: 95 sq miles (246 sq km).
Best time to visit: October to June.
Animals & birds of the park: Still has a few tiger and leopard. Other animals seen include sloth bear, chital and sambar.

Valley of Flowers National Park

Established: 1981.
Location: Near the Nanda Devi National Park in the Garhwal Himalayas.
Size: 33.5 sq miles (87 sq km).
Best time to visit: July and August when the myriad flowers are in bloom.
Animals & birds of the park: One of the most remarkable areas in the

Himalayas, this small park is now a proposed biosphere reserve. Apart from the remarkable flora, there is an interesting range of birds and animals, including tahr, musk deer and leopard. F.W. Smyth's book *The Valley of Flowers*, published in 1938, gives a dramatic description of the area's discovery.

Other sanctuaries in UP include **Chandra Prabha** (Varanasi District), where lions were unsuccessfully reintroduced in the late 1950s, **Mahavir Swami** (Lalitpur District), **Motichur** (Dehra Dun District), **Nawabganj Sanctuary** (Unnao District) and **Ranipur** (Banda District).

For further information, contact the Chief Wildlife Warden, 17 Rana Pratap Marg, Lucknow.

WEST BENGAL

Stretching from the Bay of Bengal to the foothills of the Himalayas, the narrow strip forming West Bengal includes a range of climates and diversity of habitat. The state is small and the high human population density has meant the few protected areas are also small and need to be expanded and upgraded if they are to remain viable gene pools and allow the restoration of sustaining populations of swamp deer, rhinoceros, buffalo and the bengal florican.

Ballavpur Sanctuary

Established: 1977.
Location: On the grounds of Rabindranath Tagor's university at Santiniketan.
Size: 0.75 sq miles (2 sq km).
Best time to visit: November to February.
Animals & birds of the park: This small sanctuary holds captive blackbuck.

Buxa Tiger Reserve

Established: This area came under Project Tiger during the winter of 1982/83.
Location: To the west of Manas Tiger Reserve (Assam) close to the border with Bhutan in Jalpaiguri District.
Size: 121 sq miles (314 sq km).
Best time to visit: November to April.
Animals & birds of the park: At present the core only has sanctuary status but needs to be upgraded to a national park and the buffer area to be declared a wildlife sanctuary. The reserve forms a vital linking corridor for elephants migrating between the forests of Bhutan to the north and the Manas Tiger Reserve in Assam to the east. The eastern boundary is the Sankosh River which is turns forms the western boundary of Manas Tiger Reserve in Assam. Except for an area of under 40 sq miles (100 sq km) much of the reserve was intensively worked in the recent past and the forest has taken over from the natural reed-lands. Much of the forest is sal, some of it planted. To the west a corridor has been proposed linking Buxa with Jaldapara. The range of animals is large and includes, apart from tiger and elephant, gaur, sambar, muntjac, leopard cat and sloth bear. Mahaseer can still be found in the Rydak river.

Haliday Island Sanctuary

Established: 1976.
Location: At the mouth of the Matla river in the Hoogly delta.
Best time to visit: October to March.
Animals & birds of the park: This small pocket of mangrove forest is the nesting area of sea turtles and saltwater crocodiles. Tigers occasionally visit.

Jaldapara Sanctuary

Established: 1941 to protect the rhinoceros, of which there are now about 50 in the sanctuary.
Location: Lies at the foot of the Bhutan hills in the *terai* belt of Darjeeling District.
Size: 44 sq miles (115 sq km).
Best time to visit: November to April.
Animals & birds of the park: The sanctuary needs to be expanded and upgraded to national park. One proposed extension will link up with the Buxa Tiger Reserve. Two rivers flow through the sanctuary: the Torsa (now largely dry) and the Malangi. The sandy river banks have extensive belts of tall grass. The forest is rich, mixed deciduous and riding elephants is the only way to move through the area. Apart from rhino, there are tiger, gaur, leopard, sambar, muntjac, hog deer and the occasional elephant. Among the rich avifauna, the Bengal florican is typical of the area.

Lothian Island Sanctuary

Established: 1976.
Location: At the mouth of the Saptamukhi river in the 24 Parganas District and is part of the Sunderban.
Size: 14 sq miles (37 sq km).
Best time to visit: October to March.
Animals & birds of the park: Mostly tropical estuarine swamp forest with a few grassy patches along the edge of the mangrove. Migrant birds visit in the winter. Animals found include the chital, rhesus macaque and the occasional jungle cat. It is also a nesting area for numerous sea turtles.

Mahananda Sanctuary

Established: 1949 and upgraded in 1976.
Location: Located between the Tista and Mahananda rivers on the foothills of the eastern Himalayas in Darjeeling District.
Size: 50 sq miles (130 sq km).
Best time to visit: November to March.
Animals & birds of the park: The height ranges from 500 to 4,266 ft (150–1,300 metres) above mean sea level and this is reflected in the range of animals seen. A reservoir on the Mahananda river falls within the park. A few sambar deer on the lower grasslands, the occasional elephant, leopard, gaur and some introduced gibbons are some of the animals. In the higher forest are some magnificent trees where serow are found.

Sajnakhali Sanctuary

Established: 1976.
Location: In the Sunderbans.
Size: 140 sq miles (362 sq km).
Best time to visit: July to September.
Animals & birds of the park: Tiger, smooth Indian otters and fishing cat are the main mammals seen, along with a few ridley turtles. During June to October the sanctuary is a successful mixed heronry.

Singalia National Park

Location: West of Darjeeling following the Indo-Nepal border.
Best time to visit: November to April.
Animals & birds of the park: The area west of the border is now largely deforested and the contrast can be seen while following the "Sandakphu trek" along the Singalia ridge. A bird list for the park covers 160 species including the satyr tragopan, blue-fronted robin, golden-breasted fullvetta and brown parrotbill.

Sunderbans National Park & Tiger Reserve

Established: Was declared a National Park in 1984.
Location: In the Ganga delta stretched from the Hugli in the west to the Teulia river in the east.
Size: Covering over 4,526 sq miles (11,720 sq km). The reserve is 998 sq miles (2,585 sq km) of which the national park is 513 sq miles (1,330 sq km) and forms the core.
Best time to visit: December to February.
Animals & birds of the park: The Sunderbans cover a vast region of mangrove swamp, forested islands and small rivers near the Bay of Bengal. Most of the area is estuarine mangrove forest and swamp supporting an ecosystem specially adapted to high salinity. The park holds more tigers than any other tiger reserve. In the area to the east under Bangladesh, slightly more than 400 tigers were recorded in its 2,600 sq miles (6,735 sq km) during the mid 1980s – this had fallen to 242 by 1995. Project Tiger has also launched a program to conserve the olive ridley sea turtles. The Gangetic dolphin is found in the Raimangal river.

Other sanctuaries in Bengal include **Bethuadhari** (Nadia District), **Chapramari** (Jalpaiguri District) – good birds, **Gorumara** (Jalpaiguri District) – a beautiful sanctuary in the flood plain of the Murti and Jaldaka rivers with a few rhinoceros, elephant and good birds, **Jorepokhri Salamander Sanctuary** (Darjeeling District) – a small lake 18 miles (28 km) from Darjeeling near Sukhiapokhri – established to protect the habitat for the extremely rare Indian salamander *(Tylotoriton verricosus)*. **Narendrapur** (24 Parganas), **Raiganj** (West Dinajpur District) – a small bird sanctuary 1 mile (2 km) from Raiganj, **Ramnabagan** (Burdwan District) and **Senchal** (Darjeeling District).

For further information contact the Chief Conservator of Forest and Chief Wildlife Warden, P-16 India Exchange Place Extn., New C.I.T. Building (3rd floor), Kolkata 700073.

Sri Lanka

Apart from the Wilpattu and Yala National Park, Sri Lanka has a relatively large area of protected wilderness compared to the other countries of South Asia.

Information on all areas is available at the Department of Wildlife Conservation, State Timber Corporation Building, No. 82, Rajamawatha Road, Batteramulla (near Sri Jayawardenapura, Kotte).

Gal Ova National Park

Established: 1954.
Location: In the catchment area of Senanayake Samudra Reservoir.
Size: 100 sq miles (259 sq km).
Animals & birds of the park: Elephants are the animals most often seen. Excellent water birds including the magnificent white-bellied sea eagle. Boats are available.

Lahugala National Park

Established: 1980.
Size: 6 sq miles (15 sq km).
Best time to visit: Throughout the year.
Animals & birds of the park: This small park has an importance far in excess of its size. Probably the finest place in Sri Lanka to watch elephant.

Madhuru Oya National Park

Established: In November 1983.
Location: Close to the ancient city of Polonnaruwa.
Animals & birds of the park: This park was established, along with a series of other parks, to protect the traditional elephant migration corridor which stretches south of Yala.

Ruhuna National Park (Yala West)

Established: 1938.
Size: 377 sq miles (977 sq km) – only 52 sq miles (135 sq km) are used for game-viewing.
Best time to visit: Open mid-October to July.

Uda Walawe National Park

Established: 1972.
Location: Surrounding the Uda Walawe reservoir
Size: 120 sq miles (310 sq km).

Wilpattu National Park

Established: 1938.
Location: Close to the ancient Sri Lankan capital of Anuradhapura.
Size: 508 sq miles (1,316 sq km).
Animals & birds of the park: Wilpattu is famous for its leopards. Bears are also seen frequently, especially during the palu *(Manilkara hexandra)* and weera *(Drypetus aepiaria)* fruiting season.

Yala East National Park

Established: 1969.
Location: Northeast of Ruhana.
Animals & birds of the park: Excellent birdlife, especially in and around the Kumana Mangrove swamp.

Nepal

Nepal's eight national parks, three wildlife reserves and one hunting reserve fall in all faunal and geographical zones. They are home to 300 species of mammals, 800 species of birds, numerous reptiles and amphibians and many thousand species of insects. The central massif of the Himalayas forms the bulk of Nepal. Stretching 500 miles (800 km) east to west and between 90–150 miles (144–240 km) north to south, the country is bounded by India to the west, south and east and by the Tibetan region of China to the north.

A lowland area of flat doons (valleys) and riverine grasslands called the *terai* forms a belt along the southern borders with India. Over 75 percent of the rest of the country is mountainous and cut by great rivers flowing from the Tibetan plateau or the great ice caps of the Himalayas to the Gangetic plain of northern India.

The country is divided into two distinct zoogeographic zones, with the Kali Gandaki river forming a natural division between east and west. The north–south range in altitude complicates the compressed and extensive variety of habitat, but ensures that no part of the country is without interest to the ornithologist, the trekker or in fact to any visitor.

The system of parks and reserves in Nepal was started in 1973 with funds and technical assistance from the United National Development Programme and the Food and Agriculture Organisation. Some areas had earlier been set aside as hunting reserves by the Rana regime (1846–1950) and a small rhino reserve was established in Chitwan in 1961 following a 1959 survey by E.P. Gee, the distinguished British naturalist who had dedicated his life to the wildlife of South Asia.

The National Parks and Wildlife Conservation Department of the Ministry of Forests have offices in Baneswor, and can provide information, maps and check lists of birds and animals for the national parks and wildlife reserves. They also administer the Dhorpatan Hunting Reserve, a 512 sq mile (1,325 sq km) area in the western hills containing blue sheep.

The trekking permits necessary to visit all the mountain parks are issued by the Department of Immigration in Thamel.

Annapurna Conservation Area

Location: The region is dominated by the Annapurna ranges in north-central Nepal and comprises valleys and hills including the Annapurna Sanctuary south of the range, the Kali Gandaki valley from Tatopani to Mustang and Muktinath, the Marsyangdi valley from Bhulbhule to Manang in the north and the many summits of this great Himalayan massif. Altitudes range from as low as 2,798 ft (853 metres) at Bhulbhule to 26,545 ft (8,091 metres), the summit of Annapurna I.

Size: 1,027 sq miles (2,660 sq km).

Best time to visit: The best time would be from September to May, although most trails are accessible throughout the year, the high Thorong La pass (17,769 ft/5,416 metres) and the Sanctuary are snow bound from December to March.

Animals & birds of the park: The high alpine areas harbour the snow leopard and *bharal* (blue sheep). Along the lower hills and forest are found rhesus and langur monkeys, jungle cats, civets, giant flying squirrels, goral, tahr and leopard. Birds of the area include the Impeyan pheasant, the Koklas, Tragopan and blood pheasants. In the spring and summer the dense forests of the south-facing slopes are alive with many species of nesting birds, butterflies, flowering orchids and rhododendrons.

Royal Bardia National Park

Established: 1976 and extended 1984.

Location: The Royal Bardia National Park covers parts of the Siwalik hills and a narrow strip of *terai* lowlands in the Bheri zone of Nepal, about 250 miles (400 km) southwest of Kathmandu. The Karnali river forms the western limits of the park, which also includes the southern slopes of the Siwalik hills, covered by stands of sal forest interspersed with patches of open short grasslands. The lower *terai* belt and flood plain of the Karnali River support a riverine ecology typical of the *terai*. Altitudes vary between 500 ft (150 metres), on the banks of the Karnali to 3,300 ft (1,000 metres) on the crest of the Siwalik range.

Size: 374 sq miles (968 sq km).

Best time to visit: November to March.

Animals & birds of the park: The porous slopes of the Siwalik and lowland *terai* support large open grasslands. These *phantas*, such as Baghaura and Lamkhole, are home to large animals such as barasingha (swamp deer); spotted, hog, barking and sambar deer; a small number of black buck; common langur and rhesus macaque monkeys; sloth bear; leopard and the Royal Bengal tiger. Bardia is considered to be one of the best places to view tiger in the wild in South Asia and has a high percentage of daylight sightings. The park also supports a small number of wild elephant, remnants of former populations. Twenty-five rhinos were translocated from Chitwan to Bardia as part of a preservation project. More than 350 species of birds have been recorded and the Karnali and Babai rivers attract a large number of wintering water fowl along with resident species such as herons, kingfishers and wall creepers.

Royal Chitwan National Park

Established: 1973 and extended 1976.

Location: The Royal Chitwan National Park extends south of the Rapti river to the Siwalik hills and east of the Narayani river in the Chitwan District of Narayani zone in south-central Nepal. Much of the park is high ground along the

Siwalik hills which are covered by deciduous sal forest. The floodplain of the Narayani, Rapti and Rue rivers make up about a fifth of the park. This low lying riverine belt is colonised by large expanses of tall elephant grasses, interspersed with trees including the silk cotton (kapok), acacia, cesium and the flame of the forest.
Size: 402 sq miles (1,040 sq km)
Best time to visit: September to June. Though the park is open throughout the year, most visitors avoid the hot monsoon months July and August.

Khaptad National Park

Established: 1984.
Location: This middle hill region of west Nepal lies south of the Seti river at the cross point of Bajura, Bajang, Doti and Achham districts of Seti zone. Much of the park is a plateau at an altitude of over 10,000 ft (3,000 metres).
Size: 87 sq miles (225 sq km)
Best time to visit: Open year around but best to visit between November and May.
Animals & birds of the park: Mammals of the park include leopard, marten, musk and barking deer, and black bear. More than 200 bird species occur here, including the Impeyan, Koklas and Kalij pheasants.

Koshi Tappu Wildlife Reserve

Established: 1976.
Location: Situated 220 miles (350 km) east of Kathmandu on the alluvial flood plains of the Sapta Kosi river at an altitude of less than 800 ft (240 metres). The reserve is bounded on the east and west by the river embankments and on the south by the barrage that forms the border with India.
Size: 175 sq miles (68 sq km).
Best time to visit: Open throughout the year but is best from November through to March, when migrant wildfowl and wading birds are visiting. This area is particularly interesting during late February and early March when thousands of migrant birds nest here.
Animals & birds of the park: The park is one of the last havens for a small population of the Asian wild buffalo. The spotted deer (chital), hog deer, wild boar and leopard are found here and nilgai (blue bull) are also reported. Birds of the park and the Kosi water system include almost all South Asian species of wildfowl; egrets, ibises, gulls, terns, storks and waders visit the park during the spring migration.

Langtang National Park

Established: 1976.
Location: Almost due north of Kathmandu, Langtang valley is bordered on the north by the main Himalayan range dominated by Langtang Lirung (23,780 ft, 7,250 metres). The park covers the Langtang valley, the Gosainkund lake area and the forested hillsides above the Helambu villages.
Size: 660 sq miles (1,710 sq km).
Best time to visit: The park is open throughout the year but high passes of Gosainkund and Ganja La will be snowbound during December to March. The best time is between March and November, avoiding the monsoon from June to September.
Animals & birds of the park: The richly forested lower hillside and alpine pastures harbour animals such as the red panda, langur monkey, barking deer, musk deer, black bear, tahr, ghoral, leopard, and possibly even the snow leopard. Among the birds found in the park are the ibis bill, which breeds here during the summer. Other birds found are the honey guide, Impeyan, Tragopan and Kalij pheasants, Tibetan snow cock and snow partridges amongst many others.

Makalu Barun National Park & Conservation Areas

Established: 1991.
Location: Northeast Nepal adjoining the eastern boundary of Sagarmatha National Park in Sankhuwasabha and Solukhumbu Districts.
Size: 900 sq miles (2,330 sq km).
Best Time to Visit: October to May.
Birds & Animals of the park: Mammals include the red panda, musk deer, ghoral, thar, serow, leopard, Himalayan black bear, wild boar, barking deer and some 440 species of birds.

Parsa Wildlife Reserve

Established: 1984.
Location: Adjacent to the eastern end of Royal Chitwan National Park.
Size: 193 sq miles (500 sq km).
Best time to visit: September to June.
Animals & birds of the park: Parsa is in effect an extention of Royal Chitwan National Park but has Nepal's largest resident herd of wild elephants.

Rara National Park

Established: 1976.
Location: About 250 miles (400 km) northwest of Kathmandu in the Karnali zone, this beautiful park covers the sub-alpine Himalayan ecosystem with altitudes varying between 7,000–13,400 ft (2,134–4,084 metres). Lake Rara itself is at 9,815 ft (2,990 metres).
Size: 41 sq miles (106 sq km).
Best time to visit: Open all year round but best time to visit is March–May and October–December.
Animals & birds of the park: The park supports a number of the elusive and little known red panda. Other animals include yellow-throated marten, goral, serow, musk deer, and possibly leopard, wolf and black bear. The lake attracts migrant wildfowl such as teal, pochard and mallard. Resident birds include Kalij, Impeyan and blood pheasants.

Sagarmatha National Park

Established: 1976 and declared a World Heritage Site in 1979 by UNESCO.
Location: The park comprises the area south, west and east of Mount Everest in the Khumbu Himal northeast Nepal. Sagarmatha, the Nepali name for Everest means "Mother of the Universe" and is the catchment basin of the great Sapta Kosi river system, one of the largest drainage systems of Nepal. This park spans from a minimum of 10,000 ft (3,000 metres) to four of

the highest mountains in the world including Everest (29,028 ft/8,848 metres), Cho Oyu (26,906 ft/8,201 metres), Lhotse (27,940 ft/8,516 metres) and Makalu (27,766 ft/8,463 metres) and boasts some the earth's most spectacular mountain scenery.
Size: 480 sq miles (1,243 sq km).
Best time to visit: October–November and March–May although the park is open throughout the year. Much of the park is snowbound from December to March and although travel is allowed during the monsoon months from June to September rain clouds obscure the mountain views much of the time.
Animals & birds of the park: Wild animals most likely to be seen are Himalayan tahr, goral, musk deer, pika (mouse hare), weasels and jackals. More rarely seen animals may include black bear, wolf, lynx and snow leopard. More than 400 species of birds are recorded in the park and include Nepal's colourful national bird, the Impeyan pheasant. Also found are blood pheasant, Tibetan snow cock, snow pigeons, red and yellow billed choughs, Himalayan griffon and the lammergeier or bearded vulture.

Shey Phoksundo National Park

Established: 1984.
Location: Nepal's largest and most remote national park lies northwest of Kathmandu covering trans-Himalayan habitat in the Dolpo District of Dhaulagiri zone. The entire park lies above 9,000 ft (2,700 metres) and includes several peaks over 20,000 ft (6,000 metres) of the Kanjiroba Himal. Much of the area lies in the rainshadow north of the Dhaulagiri range and forms the catchment area of the main eastern tributaries of the Karnali river which drains the region to the west.
Size: 1,373 sq miles (3,555 sq km).
Best time to visit: The post-monsoon months of October and November and the late spring months of April to early June.
Animals & birds of the park: The larger fauna of the park are blue sheep, goral, musk deer, tahr, black bear, barking deer, rhesus and langur monkeys, wild dogs, wolf, marmot, weasel, mouse hare, lynx and snow leopard. The first comprehensive study of these endangered big cats was conducted in the remote Langu gorge in the northwestern area of the park. The birds of the park include the Impeyan, blood and Cheer pheasants, choughs, ravens, Tibetan snow cocks, brown dipper, Himalayan griffon and lammergeier.

Royal Sukla Phanta Wildlife Reserve

Established: 1976.
Location: This reserve is situated in the extreme southwestern end of the country, within the eastern bend of the Sarda river along the Indian border. Large open grassland areas are fringed by sal forest. The park is named from the largest of these grasslands – the Sukla Phanta.
Size: 60 sq miles (155 sq km).
Best time to visit: November to April. Though open throughout the year, parts are inaccessible during the monsoon.
Animals & birds of the park: The grassland and forest environment constitutes some of the last remaining habitat for such threatened animals as the hispid hare and pygmy hog. Sukla Phanta is also one of the last strongholds of the endangered barasingha (swamp deer). Other animals include spotted and hog deer, nilgai (blue bull), wild dog, jackal, jungle cat, porcupine and otter. A few tiger and a small group of elephant also live in the park. The lake and swampy area at Rani Tal attracts many species of birds such as heron, duck, storks, kingfishers and egret.

Language

With 18 official languages, hundreds of others and countless dialects, India can present a linguistic minefield. Luckily for the traveller, English is often understood and it is usually possible to get by. However, attempts to speak the local language are always appreciated. The language most widely spoken in the North is Hindi, while in the South, Tamil has the highest profile.

Indian languages are phonetically regular, based on syllables rather than an alphabet. Important differences are made between long and short vowels, and reteroflex, palatal and labial consonants – listen hard to get a feel for the vocabulary below. There are various systems of transliteration and you may see many of the words below spelt different ways in English. Where a consonant is followed by "h" this is an aspirated sound, "c" is usually pronounced "ch" (followed by "h", "chh"), and "zh" in Tamil stands for a sound somewhere between a reteroflex "l" and "r".

Traveller's Hindi

Basics

Hello/goodbye *Namaste*
Yes *Ji ha*
No *Ji nehi*
Perhaps *Shayad*
Thank you *Dhanyavad/shukriya*
How are you? *Ap kaise hai?/Ap thik hai?*
I am well *Me thik hu/thik hai*
What is your name? *Apka nam kya hai?*
My name is (John/Jane) *Mera nam (John/Jane) hai*
Where do you come from? *Ap kahan se aye?*

From (England) *(England) se*
How much (money)? *Kitna paise hai?*
That is expensive *Bahut mahenga hai*
Cheap *Sasta*
I like (tea) *Mujhe (chai) pasand hai*
Is it possible? *Kya ye sambhav hai?*
I don't understand *Mujhe samajh nehi*
I don't know *Mujhe malum nehi*
Money *Paisa*
Newspaper *Akhbar*
Sheet *Chadar*
Blanket *Kambal*
Bed *Kot/palang*
Bucket *Balti*
Room *Kamra*
Please clean my room *Mera kamra saf kijie*
Clothes *Kapre*
Cloth *Kapra*
Market *Bajar*

Pronouns

I am *Mai hun*
You are *Ap hain*
He/she/it is *Voh hai*
They are *Ve hain*

Verbs

To drink *Pina*
To eat *Khanna*
To do/make *Karna*
To buy *Kharidna*
To sleep *Sona*
To see *Dekhna*
To hear/listen to *Sunna*
To wash (clothes) *Dona*
To wash (yourself) *Nahana*
To get *Milna*

Prepositions, adverbs and adjectives

Now *Ab*
Right now *Abhi*
Quickly *Jaldi*
Slowly *Dirhe se*
A bit *Bahut*
A little *Tora*
Here *Yaha/idhar*
There *Vaha/udhar*
Open *Khola*
Closed *Bund*
Big/older *Bara*
Small/younger *Chota*
Beautiful *Sundar*
Old *Purana*
New *Naya*

Hindi Numbers

1	*ek*	**30**	*tis*
2	*do*	**40**	*chalis*
3	*tin*	**50**	*pachas*
4	*char*	**60**	*sath*
5	*panch*	**70**	*setur*
6	*che*	**80**	*assi*
7	*sat*	**90**	*nabbe*
8	*arth*	**100**	*sau*
9	*nau*	**1,000**	*hazar*
10	*das*	**100,000**	*lakh*
20	*bis*	**10,000,000**	*kror*

Questions

What is? *Kya hai?*
Where is? *Kahan hai?*
Why? *Kyun?*
Who is? *Kaun hai?*
When is? *Kab hai?*
How? *Kaisa?*
Most sentences can be turned into a question by putting *"kya"* on the front and raising the pitch of the voice at the end, e.g. *"Dhobi hai"*, "There is a washerman", *"Kya dhobi hai?"*, "Is there a washerman?"

Days of the week

Monday *Somvar*
Tuesday *Mangalvar*
Wednesday *Budhvar*
Thursday *Guruvar*
Friday *Shukravar*
Saturday *Shanivar*
Sunday *Itvar*
Today *Aj*
Yesterday/tomorrow *Kal*
Week *Hafta*

Months

January *Janvari*
February *Farvari*
March *March*
April *Aprail*
May *Mai*
June *Jun*
July *Julai*
August *Agast*
September *Sitambar*
October *Aktubar*
November *Navambar*
December *Disambar*
Month *Mahina*
Year *Sal*

Travel

Where is (Delhi)? *(Dilli) kahan hai?*
Bus station *Bus adda*
Railway station *Tren stashan/ railgari*
Airport *Hawai adda*
Car *Gari*
How far is it? *Kitna dur hai?*
In front of/opposite (the Taj Mahal) *(Taj Mahal) ke samne*
Near *Ke nazdik/ke pas*
Far *Dur*
Ticket *Tikat*
Stop *Rukh jaiye*
Let's go *Chele jao*
I have to go *Mujhe jana hai*
Come *Ayie*
Go *Jayie*

Health

Doctor *Daktar*
Hospital *Aspatal*
Dentist *Dentist*
Pain *Dard*
I am ill *Main bimar hun*

Tamil Numbers

1	*onru*
2	*irandu*
3	*munru*
4	*nanku*
5	*aindu*
6	*aru*
7	*yezhu*
8	*yettu*
9	*onpadu*
10	*pattu*
11	*patinonru*
12	*pannirandu*
100	*nuru*
100,000	*latcam*
10,000,000	*kodi*

I have been vomiting *Ulti ho rahi thi*
I have a temperature *Mujhe bukhar hai*
I have a headache *Mere sir men dard hai*
I have a stomach ache *Mere pat men dard hai*
I have diarrhoea *Mujhe dast ar raha hai*
The English word "motions" is a common expression for diarrhoea.

Relatives

Mother *Mata-ji*
Father *Pita-ji*
Sister *Behen*
Brother *Bhai*
Husband *Pati*
Wife *Patni*
Maternal grandmother *Nani*
Maternal grandfather *Nana*
Paternal grandmother *Dadi*
Paternal grandfather *Dada*
Elder sister (term of respect) *Didi*
Daughter *Beti*
Son *Beta*
Girl *Larki*
Boy *Larka*
Are you married? *Kya ap shadishuda hai?*
Are you alone (male/female)? *Kya ap akela/akeli?*
How many children have you got? *Apke kitne bache hai?*
How many brothers and sisters have you got? *Apke kitne bhai behen hai?*

Food

I want (a thali) *Mujhe (thali) chahiye*
Without chilli *Mirch ke bina*
Little chilli *Kam mirch*
Hot *Garam*
Cold *Tanda*
Ripe/cooked *Pukka*
Unripe/raw *Kucha*

Basics

Mirch **Chilli**
Namak **Salt**
Ghi **Clarified butter**
Dahi **Yoghurt**
Raita **Yoghurt with cucumber**
Chaval **Rice**
Panir **Cheese**
Pani **Water**
Dudh **Milk**
Lassi **Yoghurt drink**
Nimbu pani **Lime water**
Tandur **Oven**
Pilao **Rice cooked with *ghi* and spices**
Biryani **Rice cooked with vegetables or meat**
Mithai **Sweets**

Breads *(Roti)*

Puri **Deep-fried and puffed-up wheat bread**
Chapati **Flat, unleavened bread**
Nan **Leavened flat bread**
Tanduri roti **Similar to *nan***
Paratha **Chapati cooked with *ghi***

Vegetables *(Sabzi)*

Palak **Spinach**
Allu **Potato**
Gobi **Cauliflower**
Bindi **Okra**
Pyaz **Onion**
Sarsun **Mustard greens**
Mattar **Peas**
Tamata **Tomato**
Baingain/brinjal **Aubergine**
Dal **Dried pulses**

Meat

Ghost **Lamb**
Murg **Chicken**
Machli **Fish**

Fruit

Kela **Banana**
Santra **Orange**
Aum **Mango**
Amrud **Guava**
Nariyal **Coconut**

Traveller's Tamil

Basics

Hello *Vanakkam*
Goodbye *Poyvituvarukiren* (Reply *Poyvituvarungal*)
Yes *Amam*
No *Illai*
Perhaps *Oruvelai*
Thank you *Nandri*
How are you? *Celakkiyama?*
What is your name? *Ungal peyar yenna?*
My name is (John/Jane) *Yen peyar (John/Jane)*
Where is the (hotel)? *(Hotel) yenge?*
What is this/that? *Idu/Adu yenna?*
What is the price? *Yenna vilai?*
That is very expensive *Anda vilai mikavum adikum*
I want (coffee) *(Kapi) Vendum*
I like (dosa) *(Dosai) Pudikkum*
Is it possible? *Mudiyuma?*
I don't understand *Puriyadu*
Enough *Podum*
Toilet *Tailet*
Bed *Kattil*
Train *Rayil*
Sari *Pudavai*
Dhoti *Vesti*
Towel *Tundu*
Sandals *Ceruppu*
Money *Punam*
Temple *Kovil*

Verbs

Come (imperative) *Varungal*
Go (imperative) *Pongal*
Stop (imperative) *Nillungal*
Sleep *Tungu*
Eat *Sappidu*
Drink *Kudi*
Buy *Vangu*
Pay (money) *Punam kodu* (literally "give money")
See *Par*
Wash (clothes) *Tuvai*
Wash (yourself) *Kazhavu*

Prepositions, adverbs and adjectives

Quickly *Sikkirum*
Slowly *Meduvaka*
A lot *Mikavum*
A little *Koncam*
Here *Inge*
There *Ange*
This *Idu*
That *Adu*
Now *Ippodu*
Same *Ade*
Good *Nalla*
Bad *Ketta*
Hot *Karam*
Cold *Kulirana*
Beautiful *Azhakana*
Sweet *Inippu*
Big *Periya*
Small *Cinna*
Old *Pazhaiya*
New *Pudiya*

Days of the week

Monday *Tingal*
Tuesday *Cevvay*
Wednesday *Putam*
Thursday *Viyazhan*
Friday *Velli*
Saturday *Ceni*
Sunday *Nayiri*
Today *Inraikku*
Week *Varam*

Month *Matam*
Year *Varutam*

Questions & "and"

How? *Yeppadi?*
What? *Yenna?*
Who? *Yar?*
Why? *Yen?*
Where? *Yenge?*
When? *Yeppodu?*
How much? *Yettanai/Yevvalavu?*
Questions in Tamil are usually formed by adding a long "a" to the last word of a sentence (usually the verb), e.g. *"Ningal venduma?"* "What do you want?". "And" is formed by adding "um" to the end of the nouns (with an extra "y" if the noun ends in a vowel), e.g. *"Kapiyum, dosaiyum"*, "Coffee and dosa".

Pronouns and relatives

I *Nan*
You *Ningal*
He/She/It *Avan/Aval/Avar*
We (including addressee)/ (excluding addressee) *Nam/Nangal*
They *Avakal*
Man *Manidan*
Woman/Girl/Daughter *Pen*
Boy/Son *Paiyan*
Children *Pillaikal*
Baby *Pappu*
Mother *Amma*
Father *Appa*
Husband *Kanavan*
Wife *Manaivi*

Food (Sappadu)

Tunnir Water
Sadum Rice
Puzham Fruit
Kaykuri Vegetables
Pal Milk
Iddli Steamed rice cakes
Dosai Pancake made from fermented dough
Vadai Deep fried snack made of *dal*
Rasam Thin, spicy soup, usually with a tamarind base
Sambar Thick soup made from *dal*
Poriyal Dry vegetable curry
Mils "Meals", similar to a North Indian *thali*, traditionally served on a banana leaf
Payasam Sweet rice dish served at festivals

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Suresh Elamon 276
Dr. J. Fox 168/169
Gen. R. K. Gaur 146/147, 151
Sharad Gaur 63, 105
K. Ghani 199
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Iain Green 4/5
K.K. Gurung 28, 207, 208
Hans Höfer 27, 28/29, 46/47, 78, 166/167, 170/171, 202
Thomas Kelly 24, 51
Ashwin Mehta 84R, 89
Pramod Mistry 237, 238/239
Aditya Patankar 268
E. Hanumantha Rao 92, 99, 107, 112, 113, 115, 266
G. P. Reichelt 288
Sanctuary Magazine (C. Bassapannavar) 61
Sanctuary Magazine (G. & H. Denzau) 193, 262
Sanctuary Magazine (Robert D'Souza) 66/67, 240
Sanctuary Magazine (I. Kehimkar) back cover right, 123, 125
Sanctuary Magazine (Natarajan) 140R
Sanctuary Magazine (Perumal T.N.A.) 88
Sanctuary Magazine (Perunthauni) 165
Sanctuary Magazine (Kailash Sankhala) 159
Kailash Sankhala 53, 103, 104, 150L, 155, 156, 157, 158, 161, 227, 236, 247, 249
Kevin Schafer 206
Dr. Geeti Sen 18, 30
Toby Sinclair back cover top, 20, 21, 25, 26, 33, 36/37, 70, 87, 91, 187, 198, 200/201, 205, 209, 248
Brijendra Singh front flap bottom, 22, 23, 71, 116, 141, 162, 184/185, 186, 189, 191, 192
Tom Tidball 272
Joanna Van Gruisen 68, 69, 74, 82, 84L, 86, 95, 97, 98, 102, 109, 110, 111, 117, 118, 128, 136, 148, 174, 176/177, 178, 181, 182, 183, 196L, 212/213, 214, 216, 217, 218, 220, 243, 251, 277, 286, 292, 294, 295
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Index

a

Abies pindrow (tree) 54
Acacia 51
Adina (tree) 51
adjutant stork 250
African elephant 75
African lion 68
African rhinocerous (black & white) 76
ahimsa (non-violence) 30
Akasa Chetiya (Elephant Rock megalith in Yala) 289
Akbar Nama 16
alarm calls 43
Alexandrine (large Indian) **parakeet** 139, 264
Alpine accentor (bird) 182
alpine forest 49
ananta (serpent) 31
Anantpura (in Ranthambhore) 234, 235
Andaman Islands 85, 93, 129, 163
animal worship 30
antelope (bharal) 87–89, 150, 158, 159; *also see*
greater kudu
dik dik
blackbuck
chinkara gazelle
four-horned antelope
nilgai
Tibetan antelope
blue-bull
Anthocephalus 54
anthrax 76
antlers 44
Anuradhapura (capital of Sri Lanka) 285
apes 99; *also see*
Hoolock gibbon
Aranya Nivas rest house in Periyar 273
argali sheep 149; *also see*
Marco Polo sheep
navan or great Tibetan sheep
art 35
Arunachal Pradesh 75
Aryans 30
Ashoka, king 30, 33, 49, 175, 241
Asokan pillar 32
ashy wren warbler 139
Asian elephant 75, 77, 261, 274
Asiatic or Indian lion 68, 241, 242
Asiatic wild buffalo
see wild buffalo
Assam 22, 25, 52, 54, 77, 84, 87
Assamese macaque 95, 219
Assam rabbit (hispid hare) 121, 211, 218
avadavat
see red munta
Avifauna studies 22
axis (deer)
see chital

b

Babai river 209
babbler 142, 181, 192, 250, 264; *also see*
black-headed babbler
common babbler
jungle babbler
Quaker babbler
rutous-bellied babbler
spiny babbler
spotted babbler
babul forest 226
Balamites (tree) 50
baleen whale 164
Balinese tiger 65
Balle (elephant resting camp) 268
bamboo 51, 253, 260
bamboo rats 119; *also see*
bay bamboo rat
hoary bamboo rat
Bandhavgarh forest 26, 64, 253
National Park 253–255
Bandipur National Park and Tiger Reserve 77, 87, 259–266, 268
bank myna 137
barasingha (swamp deer) 84, 196, 202, 209, 216, 217, 220, 246, 248, 249
Barbary lion 68
Barbet 139, 192, 268
crimson-breasted barbet or coppersmith 139
large green barbet 139
barheaded goose 192, 217, 227
barking deer (muntjac) 65, 76, 86, 87, 151, 192, 198, 207, 209, 220, 248, 254, 262, 269, 273, 275, 286, 291
barn owl 138
Barringtonia (tree) 54
bata (fish) 226
bats 121, 263; *also see*
bearded sheath-tailed bat
flying fox
fulvous fruit-bat
giant fruit bat
great eastern horsehoe bat
Indian false vampire
Indian Pipistrelle
short-nosed fruit-bat
bay bamboo rat 119
bear 104, 105, 107, 108, 283, 285, 289, 290; *also see*
brown bear
Himalayan black bear
sloth bear
bearded Sheath-tailed bat,
beech (stone) **marten** 114
bee-eaters 43, 177, 220, 254, 264; *also see*
blue-tailed bee-eater
common bee-eater
green bee-eater
Bengal florican 135, 198, 206, 217
Bengal monitor lizard 127
Bengal tiger 65
beru (grass) 293
Betta Tiger Reserve
see Palamau
bharal
see antelope
Bharatpur Sanctuary
see Keoladeo Ghana
bhekti (fish) 163
Bhitar Kanika Sanctuary 128
Bhopalapatnam dam project 23
Bihar 68, 75, 77, 102
Bishnoi 88
bittern 206
black bear
see Himalayan black bear
blackbuck 10, 11, 85, 87, 88, 157, 158, 209, 229, 249
blackfaced langur 94
black leopard 69
black-necked stork 291
black drongo 139
black grosbeak 180
black-headed babbler 134
black-headed gull 140
black-headed oriole 143, 206
black-naped hare 117, 121, 189, 262
black-necked crane 24, 135, 148, 153
black-necked stork 137
black pond turtle 128

blackwinged kite 146, 161, 229, 250
blackwinged stilt 141
blood pheasant 153
blossom-headed parakeet 139, 254
blue-bull (antelope) 198
blue cow
see Niglai
blue jay
see roller
blue rock pigeon 141
blue-tailed bee-eater 157
blue whale 164
Bonellis eagle 235, 243
bonnet macaque 96, 263, 269, 276
Bombax (tree) 54
Bombay
Natural History Society 22, 102, 133, 247
Borivali National Park 134
Borneo 71
Brahmaputra river 19, 86
Brahminy duck 206, 220, 228
Brahminy kite 137, 229
breeding 39
brown-back tree snake 125
brown bear
see Himalayan brown bear
brown fish owl 198
brown-headed gull 140
brown mongoose 269
brown wood owl 198
brush-tailed porcupine 119
brown-headed gull 140
Buddhism 30, 175
bulbul 134, 136, 157, 199, 220; *also see*
red-vented bulbul
red-whiskered bulbul
white-cheeked bulbul
yellow-eared bulbul
Bundala National Park 287
Burma 65, 73
bush quail 157, 243
Buttawa lagoon 291
Buttawa plains 288
buzzard 161; *also see*
crested honey buzzard
desert buzzard
long-legged buzzard

c

Cachar hills 53
Calbasu (fish) 226
Calcutta
Snake Park 126
Capparis (tree) 50
capped langur 97, 99, 214, 219
caracal (cat) 73, 234, 236
Carissa tree 68
Carnivores 31, 70
cash crops 19
Caspian Tiger 65
Cassia 50, 288
catbear
see red panda
cat snake 126
cattle 274
cattle egret 139
Caucasus 72
Cauvery river 259
Ceylon blue magpie 133, 293
Ceylon hawk 285
Ceylon Shama (bird) 144, 286
Ceylon trogon 286
Ceylon white eye (bird) 295
chameleon 127, 156
chausingha (deer) 254
Cheena Vitu water hole 287
cheetah 88
chevrotain (mouse deer) 86, 87, 262, 269, 275, 286, 291
Chinese pangolin 120
Chinese tiger 59
Chinkara stag (gazelle) 156, 159, 235, 242, 254
'Chipko' movement 24
chir pheasant 133, 153, 283
chital (spotted or axis deer) 60, 68, 85, 102, 192, 198, 210, 211, 216, 217, 220, 229, 235, 242, 244, 245, 247, 254, 261, 269, 270, 271, 283
Chitwan National Park 22, 26, 39, 40, 129, 202–207
Rhinocerous Sanctuary 79, 81
chough 183; *also see*
red billed chough
yellow billed chough
chousingha (four-horned antelope) 89, 242, 262
chukor (bird) 150
cinerious vulture 198
cinnamon sparrow 180
civet 211, 263; *also see*
palm civet
Indian civet
clawless otler 113
climate
see monsoon
clouded leopard 70, 220
cobra 193, 264, 272; *also see*
king cobra
collared dove 142
Colorado bettle 135
common bee-eater 157
common babbler 144
common crane 157, 228
common fox 161
common hare 160
common kingfisher 143
common langur 269, 276
common lora 143
common mongoose 112, 118, 119
common otter 113, 189
common palm civet 120
common quail 157
common sandpiper 140
common scops owl 268
common tree shrew 93
conch shell 163
coniferous forest 54
see deodar
conservation 21, 23, 59, 64, 175, 283
coral-reefs 19, 23
Corbett, Major Jim 187
Corbett National Park 24, 26, 64, 77, 83, 85, 184, 185, 187–193
cormorant 227, 264, 274, 294
cotton 19
crab-eating mongoose 112
Crag Martin 255
crane 157; *also see*
common crane
demiselle crane
sarus crane
Siberian crane
Crataeva roxburgiana (tree) 293
crested hawk eagle 264, 268
crested honey buzzard 250
crested serpent eagle 217, 229, 235, 237, 268
crimson tragopan (pheasant) 153
crocodile 70, 236, 286, 291; *also see*
gharial
mugger
saltwater crocodile
cuckoo (kokil) 34, 192, 268
cypress 54

d

daans (blood-sucking fly) 188
Dachigam National Park 26, 105, 151, 179–184

Dagwan river 183
Dal Lake 179
Dalbergia (tree) 51
Dalma Sanctuary 77
Danggaha Uraniya water hole 287
darter 274, 294
Deccan Plateau 19, 49
deer 32, 83–90; *also see*
barasingha
barking deer
chital
bangul
musk deer
sambar
Delhi 34; *also see*
New Delhi
demoiselle crane 130, 131, 157, 228
Deodar (tree) 52, 53, 152
Department of Wildlife, Sri Lanka 283
desert buzzard 161
desert cat 72
desert fox 103, 158, 161
desert hare 121, 160
desert monitor 156
Desert National Park 88, 156, 161
desert thorn forests 51
Dhikala Chaur, Corbett National Park 193
dhole
see wild dog
dik-dik (antelope) 87
Dipterocarpus (tree) 51
dog 101–103; *also see*
jackal
stripped hyena
wild dog
wolf
dooar (grassland) 86
Douglas-Hamilton, Iain 76
dove 142; *also see*
collared dove
little brown dove
spotted dove
drongo 134, 139, 157, 192, 259, 264; *also see*
black drongo
gray drongo
racket-tailed drongo
white-bellied drongo
drought 20, 76
Duabanga (tree) 54
Dudhwa National Park 64, 83, 84, 87, 196–199
dugong (sea cow) 163
dung beetle 155
dung piles 43; *also see*
middens
dusky blue flycatcher 295
dusky horned owl 198
dusky striped squirrel 118
Dussehra procession in Mysore 77

e

eagle 153, 198, 217, 220, 264; *also see*
Bonelli's eagle
crested hawk eagle
crested serpent eagle
eastern steppe eagle
golden eagle
gray headed fishing eagle
greater spotted eagle
mountain hawk eagle
Pallas's fishing eagle
tank eagle
tawny eagle
white bellied sea eagle
eared pheasant 153
Eastern Himalayan 54
eastern steppe eagle 133
ebony 49
ecosystems 20
Eddapaliyam (in Periyar) 273, 277
egret 139, 140, 192, 217, 220, 222, 223, 227, 229, 250, 267; *also see*
cattle egret
little egret
Egyptain vulture 161
elephant 33, 21, 42, 74, 76, 189, 198, 211–213, 216, 219, 251, 256–259, 261, 268, 269, 273, 275, 283, 284, 286, 289, 293; *also see*
African elephant
Asian elephant
marsh elephant
tusker
ermine 114
estuarine crocodile;
see saltwater estuarine crocodile
Everest National Park
see Sagarmatha National Park
Eugenia (tree) 51
Euphorbia (tree) 50

f

falcon 161; *also see*
laggar falcon
lanner falcon
peregrine falcon
famine 20
ferret badger 114
Ficus elastica (tree) 50
fire 204
fish 61
fishing cat 72, 73, 189, 198, 229
five-striped palm squirrel 118
flame tree 50, 51
flap-shell turtle 128
floods 20
floodplain forest 203
florican 199; *also see*
Bengal florican
likh florican
flycatcher 140, 157, 199; *also see*
dusky blue flycatcher
paradise flycatcher
Tickell's blue flycatcher
white spotted fantail flycatcher
flying fox (fruit bat) 122
flying frog 275
flying lizard 275
flying snake 275
flying squirrel 116, 117, 263, 269, 276, 283; *also see*
common giant flying squirrel
hairy-footed flying squirrel
Hodgson's flying squirrel
Kashmir woolly flying squirrel
large brown flying squirrel
particoloured flying squirrel
red flying squirrel
Travancore flying squirrel
folktales 35
forest 26, 49–54
forest eagle owl 198, 286
four-horned antelope;
see chousingha
fox 103, 161, 229, 254; *also see*
common fox
desert fox
hill fox
red fox
whitefooted fox

g

Gal Oya National Park 77, 294
game fish 165
Ganesh (elephant-headed god) 31

Gangetic dolphin 205, 210
Gangetic Plain 24, 52
garden lizard 127
garganey (water bird) 227, 293
Garhwal Himalaya 22, 24
Garo hills 53
gaur (Indian bison) 41, 60, 61, 78, 89, 90, 102, 206, 217, 220, 247, 254, 261, 266, 268, 273
gazelle
see chinkara
gecko 127
gerbil 118, 119; *also see*
Indian desert gerbil
Indian gerbil
gharial (fish-eating crocodile) 21, 28, 29, 129, 205, 211
Gharial Project 202, 205
ghoral (goat-antelope) 150, 192
giant fruit bat 263
giant hornbill 43
giant panda 108
giant squirrel 117, 118, 263, 269, 283; *also see*
grizzled giant squirrel
Indian giant squirrel
Malayan giant squirrel
Gir forest 25, 66–69, 83, 89, 243
Gir lion 68
Gir National Park 241–243
Girwa river 210
golden backed woodpecker 206
golden cat 71
golden eagle 153
golden langur 95, 98, 218
golden oriole 143, 181, 206
golden plover 141
Gopalaswamy Betta (in Bandipur) 266
goral
see ghoral
goshawk 161
grasshopper 155
grasslands (in Periyar) 273
gray-capped langur 97
gray drongo 243
gray-headed fishing eagle 217, 264
gray langur 168, 207, 291
gray mullet 163
gray musk shrew 116
gray partridge 157, 159, 235, 237
gray plover 141
gray shrike 140
gray wagtail 143
greylag (goose) 192, 227
great cormorants 136
great crested grede 192
great hornbill 274
great-horned owl 187
great Indian bustard 21, 23, 135; *also see*
Kareka Sanctuary
Great Indian Desert
see Thar Desert
great Indian horned owl 198, 235
great-slaty woodpecker 206
great stone plorer 193
greater kudu 87
greater spotted eagle 153
great Tibetan sheep
see nayan
green bee-eater 250, 254
green-billed coucal 133
green keelback snake 264
green pigeon 141
green shank 141
green-sea turtle 163, 164
Grewia (tree) 51
grizzled giant squirrel 117
grosbeak (bird); 180 *also see*
black grosbeak
yellow grosbeak
ground shrews
see gray musk shrew
Gujurat 68
Gulf of Mannar 163, 164
gull 140; *also see*
black-headed gull
brown-headed gull
gullbilled tern 294

h

hairy-footed flying squirrel 117
hangul 82, 181
hare 120, 121, 229; *also see*
Assam rabbit
black-naped hare
common hare
desert hare
Himalayan mouse-hare
hispid hare
Indian hare
rufous-tailed hare
hangul (Kashmir stag) 25, 151, 174, 181
Hanuman langur 96, 98, 180, 263
harrier (bird of prey) 144, 192, 220; *also see*
marsh harrier
pale harrier
pied harrier
hawksbill turtle 164
hedgehog 115, 160; *also see*
long-eared hedgehog
pale hedgehog
herbivores 31, 40
heron 140, 192, 210, 217, 220, 227; *also see*
night heron
pond heron
Hevea (tree) 50
hibernation 107
highland torque monkey 295
hill bee 277
hill fox 102, 103, 152, 180
hill myna 138, 264, 275; *also see*
Andaman hill myna
Himalaya 15, 54, 149–153, 202; *also see*
Eastern Himalayan
Inner Himalayan
Middle Himalayan
Western Himalaya
Himalayan black bear 105, 108, 109, 152, 181, 189
Himalayan brown bear 105, 108, 152
Himalayan griffon 180
Himalayan lynx 73
Himalayan marmot 118, 153
Himalayan monal 135
Himalayan mouse hare 121
Himalayan palm civet 43, 189, 198, 229, 263
Himalayan pied woodpecker 181
Himalayan pheasant 19, 135; *also see*
blood pheasant
crimson tragopan
eared pheasant
kalij pheasant
koklas phesant
peacock pheasant
Himalayan rubythroat 182
Himalayan snow-cock 133, 153
Himalayan squirrel 118; *also see*
hoary-bellied Himalayan squirrel
orange-bellied Himalayan squirrel
Himalayan striped squirrel 118
Himalayan tahr (goat) 148, 150
Himalayan weasel 114, 180
Hinduism 30, 89, 288
hippopotamus 109

hispid hare
see Assam rabbit
hoary bamboo rat 119
hoary-bellied Himalayan squirrel 117
Hodgson's flying squirrel 117
Hodgson's porcupine 119
hog badger 114
hog-deer (para deer) 86, 192, 198, 207, 220
honey badger
see ratel
Hoolock gibbon 99, 219
hoopoe 291
house crow 34, 136
house sparrow 157
hornbill 199, 206, 220, 221, 250, 254, 264; *also see*
great hornbill
Malabar gray hornbill
Malabar pied hornbill
horned toad 143
Horton Plains 295
hunting 20, 21, 34
hunting camp
18th century 36, 37
hydel projects 21, 24
hyena 207, 229, 236, 242, 254, 263

i

ibex 19, 26, 73, 150
ibis 227, 250
illama (gravel in Sri Lanka) 283
impeyan
see monal pheasant
Inchampalli dam project 23
Independence 20, 49, 88, 179
Indian bison
see gaur
Indian civet 263
Indian desert gerbil 118, 160
Indian elephant
Asian elephant
Indian false vampire
Indian gerbil 118
Indian giant squirrel 118
Indian gray mongoose 189
Indian hare 235
Indian pangolin 120
Indian porcupine 115, 119, 184, 209, 229, 236, 251, 254; *also see*
brush-tailed porcupine
Hodgson's porcupine
red porcupine
Indian rhinoceros 15, 78, 79, 79–81
Indian robin 134, 140
Indian rosewood 50
Indian salmon 163
Indian sandgrouse 157, 161
Indian short-tailed mole 116
Indian wren warbler 139
Indo-Chinese tiger 59, 65
Indravati National Park and Tiger Reserve 84
Indus Plain 51
Indus river 19
Inner Himalaya 54
insectivores 115; *also see*
ground shrew
hedgehog
mole
tree shrew
Irula Cooperative (snake hunters) 126
isabellina **lynx** 73
ivory 20

j

Jacana (water bird) 227, 235
jackal 102, 161, 180, 189, 198, 229, 234, 236, 242, 248, 254, 263
Java 71
Javan tiger 59
Jamburagala (megalith in Yala) 289
Java rhinocerous 77
Java sparrow 135
Jerdon's double-branded courser 19, 134
Jhampan (snake festival, West Bengal) 126
Jogi Mahal 235
Junagadh state 68, 69
jungle babbler 142
jungle cat 72, 152, 180, 189, 198, 229, 234, 236, 254, 263
jungle fowl 264; *also see*
gray jungle fowl
red jungle owl
jungle owlet 198
juniper 54

k

Kabini river 259
Kabini River Lodge 265
kachida valley (in Ranthambhore) 234
Kakkar (deer) 192
Kalighati (in Sariska) 235
Kalij pheasant 153, 192, 220
Kanchanpur Sanctuary 84
Kanda man-eater 187
Kankai Mata (temple) 243
kanumbu (fish) 163
Karapura 259, 264, 265
Kareka Great Indian Bustard Sanctuary 21, 156
Kanha National Park 84, 85, 246–251;
Reserve 61, 63
karnataka 50, 77
Karnali river 208
Kasara Durbar (in Chitwan National Park) 202
Kashmir 22, 151
Kashmir stag
see hangul
Kashmir woolly flying squirrel 117
Kataragama 188
Kaziranga National Park and Sanctuary 79, 81, 83, 215–217
Kedarnath Musk Deer Sanctuary 152
Keibul Lamjao National Park 83, 84
Keoladeo Ghana Sanctuary (Bharatpur) 22, 25, 26, 39, 135, 136, 225–229
Kerala state 23, 24, 77, 273
kestrel 144, 161
Khair forest 188, 204
Kiang (Himalayan animal) 151
king (black) **vulture** 144, 161, 193, 229, 248
king cobra 124, 125, 275
kingfisher 43, 142, 143, 199, 229, 237, 250, 274; *also see*
common kingfisher
pied kingfisher
whitebreasted kingfisher
Kirigalpotha peak (Sri Lanka) 295
kite 137, 274; *also see*
blackwinged kite
Brahminy kite
pariah kite
koel 136
kokkari villu (lake) 285
koklas pheasant 153, 184
Konds of Orissa 35
Korea 71
Kovalam beach (south of Madras) 163, 164
krait (snake)
see Sind Krat
Krusadai Island (Gulf of Mannar)

163
Kunu Sanctuary 88
Kukri (snake) 126
kumana mangrove swamp 294
Kutru National Park 23

l

Ladakh 22, 26, 72, 101, 150, 152, 153
Lagerstroemia (tree) 51
laggar falcon 161
Lahugala 77
National Park 293
Lakarda (in Ranthambhore) 234
Lake Palace (in Periyar) 273
Lakshadweep Islands 23, 163
lammergeier (bearded vulture) 153, 180
land use 20
langur (monkey) 40, 61, 86, 181, 193, 210, 242, 250, 254, 258; *also see*
capped langur
golden langur
gray langur
Hanuman langur
Nilgiri langur
purple-faced langur
silver leaf langur
lanner falcon 161
Lantang river 14
lapwing 144; *also see*
red-wattled lapwing
yellow-wattled lapwing
large brown flying squirrel 117
large pied wagtail 193
leatherback turtle 128, 164,
Leech 273
Legge's flowerpecker 133
lemur 93
leopard 19, 44, 64, 70, 68–71, 180, 189, 197, 207, 242, 248, 263, 265, 283, 285, 287, 289, 290; *also see*
black leopard
clouded leopard
Pottana man-eater
Punani leopard
snow leopard
leopard cat 71, 180, 189, 198, 217, 229, 263
Leopard Rock (megalith)
see Vepandeniya
lesser cats 69–73; *also see*
desert cat
fishing cat
golden cat
jungle cat
leopard cat
marbled cat
Pallas's cat
rusty spotted cat
likh florican 199
lion 33, 25, 43, 68, 69, 238–240; *also see*
African lion
Asiatic or Indian lion
Barbary lion
Gir lion
West Asian or Persian lion
lion-tailed macaque 92, 96, 276
liitle brown dove 142
little egret 140
Little Ran of Kutch (delta) 151, 160, 163
little ringed plover 141
little scops owl 268
lizard 22, 127; *also see*
flying lizard
monitor lizard
sandfish
Sita's lizard
lobster 163
locust 155
loggerhead turtle 129, 164
Logtak 83
long-billed vulture 144, 161, 193
long-eared hedgehog 115, 116
long-eared owl 139
long-legged buzzard 161
long-tailed macaque 95
long-tailed marmot 118, 153, 182
loris 93; *also see*
slender loris
slow loris
lotus 54
Lunugamwehera National Park 287
Lunuwila villu (lake) 285
lynx 73, 152; *also see*
Himalayan lynx
isabellina lynx

m

macaque 93, 94; *also see*
Assamese macaque
bonnet macaque
lion-tailed macaque
long-tailed macaque
pig-tailed macaque
rhesus macaque
stump-tailed macaque
toque macaque
machan (hide in tree or on ground) 41
Madhya Pradesh 23, 64, 84, 87, 111, 246
Madras Snake Park 126
magpie robin 144, 220
Mahadev peak 189
Mahaveli river 283
mahogany 50
mahseer (fish) 191, 210, 264, 277
makna (tuskless male elephants) 77, 274
Malabar gray hornbill 268, 275
Malabar great black woodpecker 268
Malabar pied hornbill 288, 291
Malabar squirrel 274
Malabar trogon (bird) 264, 268
Malay or common tree shrew 115
Malayan giant squirrel 118
malee (fish) 191
Maligawa (temple in Kandy) 77
malittan (tree) 288
maljurta (group of male elephants) 77
mammals 107–122
Manas Tiger Reserve 39, 40, 76, 77, 83, 218–220
Manchuria 71
man-eater 64, 77; *also see*
Kanda man-eater
Pottana man-eater
mangrove 19, 23, 61, 165
Manipur brow-antlered deer (sangai) 83
marbled cat 71
Marco Polo 19
Marco Polo sheep 149
marine life 163–165
markhor goat 150
markings 42
marmot 118, 153; *also see*
Himalayan marmot
long-tailed marmot
Marsar Lake 179
marsh crocodile
see mugger
marsh elephant 283, 293
marsh barrier 144, 229, 247
marten 113, 114; *also see*
beech (stone) marten
Nilgiri marten
yellow-throated marten
masks 35
Mastigudi (on Kabini river) 261
Melghat National Park 83

Menik Ganga (river of gems) 288
Menikrala Uraniya water hole 287
merganser (duck) 220
middens (rhino dung piles) 81
miniature paintings 34
minivet (bird) 181, 192, 199, 220, 254, 264
Mirchia Jheel (in Dudhwa National Park) 197
Madras tree shew 93
Modaragam Aru river 287
mole 116; *also see*
Indian short-tailed mole
monal pheasant 135, 152; *also see*
Himalayan monal
Selater's monal
mongoose 111, 112, 211, 229, 235, 263; *also see*
brown mongoose
common mongoose
crab-eating mongoose
Indain gray mongoose
ruddy mongoose
stripe-necked mongoose
monitor lizard 124, 129, 193, 198, 217, 235, 241, 251, 264, 269, 275; *also see*
Bengal monitor
desert monitor
water monitor
yellow monitor
monkey 40, 61, 70;
highland torque monkey
langur
purple-faced leaf monkey
torque monkey
monsoon 250
moorhen 227, 229
Mothangari (in Manas) 219
mountain goat 150; *also see*
Himalayan tahr
ibex
markhor
wild goat
mountain quail 133, 153
mouse deer
see chevrotain
mrigal (fish) 226
mudskipper 164
Mudumulai Sanctuary 77
mugger crocodile 70 126, 129, 198, 204, 211, 235, 242, 264, 268, 295
muntjac hog deer
see barking deer
murrel (fish) 226
musk deer 19, 84, 151
musk-ox 151
Muslims 89, 159
myna 35, 137, 259, 268; *also see*
bank myna
Brahminy or Blackheaded myna
hill myna
pied myna
Mysore 77, 265
mythology 19, 30–35

n

Naga 31, 35
Naga stones 31
Nagarahole National Park 83, 87, 259–266
Nagjhira National Park 87
Nal Sarovar Bird Sanctuary 136
Namdapha National Park
Tiger reserve 99
resort 99
Nanda Devi National Park and Sanctuary 23
Narbada river 89
National Chambal Sanctuary 31, 35
National Marine Park 163
National Parks, Reserves and Sanctuaries 39, 44, 181; *also see* individual listings
nayan (great Tibetan sheep) 149
Neelkanth temples 236
Nepal 15, 22, 23, 39, 49, 70
Neptune crab 165
New Actin Plan for Forestry 49
Nicobar Islands 93, 129, 163
Nicobar tree shrew 93
night heron 140
night jar 21, 264
nilgai (antelope) 60, 68, 87–89, 91, 159, 209, 229, 235–237, 247
NIlgiri langur 97, 276
Nilgiri marten 114
Nilgiri tahr (deer) 275
noddy tern 163
North Indian river 170, 171
nullah (water course) 62, 64, 110, 251
Numbal Beat (in Dachigam) 183
nutmeg 51

o

olive ridley turtle 128, 164
one-horned rhinocerous
see single-horned rhinocerous
open-billed storks 145
orange-bellied Himalayan squirrel 118
oriental hobby 161
orientation centers 26
oriole 143, 157, 199, 275; *also see*
balck-headed oriole
golden oriole
Orissa 25
osprey 210, 218, 229, 264, 274
otter 112, 113, 180, 198, 210, 217, 264, 274
tracks of 25; *also see*
clawless otter
common otter
smooth otter
owl 161, 193, 198, 237, 250, 264; *also see*
brown fish owl
brown wood owl
dusky horneed owl
forets eagle owl
great Indian horned owl
jungle owlet
scops owl
short-eared owl
spotted owlet
tawny fish owl

p

painted sandgrouse 157
painted stork 227, 229
Pakistan 72
pale harrier 144, 229
pale hedgehog 115
pale weasel 114
Palk strait 15, 133, 164
Pallas's cat 72, 152
Pallas's fishing eagle 192, 217, 218, 229
palm civet
see Himalayan palm civet
panda 109; *also see*
giant panda
red panda (catbear)
smaller panda
pangolin (scaly ant-eater) 114, 120, 262; *also see*
Chinese pangolin
Indian pangolin
Panna National Park 88
Pannikar Villa 286
panther 234, 236; *also see*
black panther

para deer
see hog-deer
paradise flycatcher 133, 140, 157, 206, 235, 272, 254, 264, 291
parakeet 139, 192, 268; *also see*
Alexandrine (large Indian) parakeet
blossom-headed parakeet
rose-ringed parakeet
pariah kite 137
particolored flying squirrel 117
Patanangala (meganth in Yala) 289
peacock 33, 34, 289, 291
peacock pheasant 253
peafowl 43, 157, 192, 204, 211, 235, 237, 250
pelican 217, 220, 227, 294
peregrine falcon 161, 249
Periyar river 277
Periyar Sanctuary & Tiger Reserve 20, 24, 77, 83, 273–277
pheasant-tailed jacana 294
pied harrier 247
pied kingfisher 143, 205
pied myna 137
pied woodpecker 243
pigeon 141, 142; *also see*
blue rock pigeon
green pigeon
pigmy hog 111, 218
pig-tailed macaque 95
Pilibhit forest 74
pinus (tree) 54
pink-headed duck 133
pipit 228
Pirotan (marine National Park) 24, 26
pitta (bird) 199, 206, 250, 264
pit viper 125, 264
pivana (breath-sucker)
see Sind krait
plover 141, 192, 227; *also see*
golden plover
gray plover
great stone plover
little ringed plover
pochard (duck) 227
Point Calimere Sanctuary 22
Pomparippu in Wilpattu 286
pond heron (paddy bird) 140
Poona serpentarium 126
Portuguese Man-o'-War 165
Pottana man-eater (leopard) 288
Pottuvil 288
praying mantis 21
predators 19, 40
primates 15, 35, 93–99; *also see*
ape
lemur
monkey
tree shrew
prawn 163; *also see*
tiger prawn
white prawn
predators 59
Project Tiger 24, 59, 190, 263, 276
Punani leopard 283
purple-faced langur 97
purple-rumped sunbird 138
purple sunbird 138
python 124, 192, 193, 198, 205, 217, 229, 251, 264, 275
Python Point (in Keoladeo) 229

q & r

quail 157, 235, 237; *also see*
bush quail
common quail
quaker babbler 142
racer (snake) 126
racket-tailed drongo 250, 254, 275
Raja (elephant) 290
Rajasthan 23, 25, 51, 64, 83, 103
Ramganga river 187, 193
Ranganathittu Bird Sanctuary 266
Ranthambhore Reserve 24, 64, 83, 233–235
ratel (honey badger) 114, 198, 207, 254
rate snake 125, 264
red-browed finch 182
red deer 151
red faced malkoha 286, 293
red flying squirrel 117
red fox 103
red headed merlin 144
red jungle fowl 211, 217, 220, 248
red munia (avadavat) 144
red panda (catbear) 106, 109, 153
red porcupine 119
red shank 141
redstart 182
red-vented bulbul 138
red-wattled lapwing 142, 144, 229
red-whiskered bulbul 138
religion 34, 19
reptiles 15, 155–157, 193, 264; *also see*
crocodile
lizard
individual listings
turtle
reticulated python 124
rhesus macaque 98, 95, 192, 207, 210, 254
rhinoceros 15, 43, 79–81, 99, 206, 211, 219; *also see*
horn 81
African rhinocerous (black & white)
Indian rhinocerous
Javan rhinocerous
single-horned rhinocerous
Sumatran rhinocerous
two-horned rhinocerous
rhododendrons 48, 49, 51, 54, 153, 278, 279
rinderpest disease 274
ring dove 157
riparian forest 54
rock python 124, 126
rodents 116; *also see*
flying squirrel
marmot
rohu 226
roller (blue jay) 144, 157, 243, 250
rose-ringed parakeet 139, 157, 217
rosy pastor (bird) 138
Royal Bardia Wildlife Reserve (Karnali) 209–211
Royle's vole 119
ruddy mongoose 112, 119, 263
rufous-bellied babbler 134
rufous-tailed hare 121
Ruhuna National Park (Yala West) 77, 288, 289
Russel's viper 125, 156, 264
rusty-spotted cat 72, 263

s

saber-toothed tiger 71
safari 39–44
Sagarmatha National Park (Everest National Park) 152, 166, 167
sal (forest) 50, 53, 196, 203, 205, 209, 253
Salix (tree) 54
salt-licks 40, 41

saltwater estuarine crocodile 129
sambar (deer) 43, 53, 60, 64, 65, 68, 79, 83, 151, 192, 198, 206, 209, 220, 229, 230, 231, 234, 236, 242, 247, 254, 261, 269, 275
sandalwood 49, 50
sand boas (snake) 126
sandfish (lizard) 156
sandgrouse 157, 235, 237
Indian sandgrouse
painted sandgrouse
spotted sandgrouse
sandpiper 140, 192, 227
common sandpiper
spotted sandpiper
sangai
see Manipur brow-antlered deer
Sangargulu Valley (Upper Dachigam) 184
Sanjay Gandhi National Park
see Borivali
sarana (fish) 226
Sariska National Park 83
Tiger Reserve 103, 236
sarus crane 198, 225, 228
Satputra National park 83
Saurashtra Peninsula 68
savanna 188
saw-scaled viper 125, 156
scavenger vulture 133, 144
Sclater's monal 135
scops owl 198
seals 30
seaweed 163
sea turtle 127, 163
seron (goat-antelope) 150, 183, 207
sewan grass 155
shad (fish) 165
shank 141; *also see*
green shank
red shank
shapu
see vrial
shark 226
Shesh Saya in Bandhsvgarh 254
shield-tail (snake) 126
shikar (tiger hunt) 21, 26, 175
sholas (tropical evergreen jungle) 273
short-eared owl 161
short-nosed fruit bat 123
shou
see Sikkim Stag
shovler 227
Shraddha (Hindu memorial ceremony) 81
Shravantal (watering place in Kanha) 249
shrews; *see*
common tree shrew
Nicobar tree shrew
Madras tree shrew
shrike (bird) 157, 192, 243, 254
Shrirangapattana (in Bandipur) 266
Siberia 59
Siberian crane 135, 228
Siberian tiger 59
Sikkim stag (shou) 151
Sikkim vole 119
Silent Valley 24
Siliserh Lake (in Sariska) 226
silver leaf monkey 99
Simlipal National Park, Tiger Reserve and Sanctuary 87
Sind krait (snake) **or pivana** 156, 193, 264
single-horned rhinocerous 21, 197, 198, 215
Sinharaja Forest Reserve 294
sisoo forest 54
Sita's lizard 127
Sivathericum (extinct ruminant) 89
skink 127
skipjack tuna 163
slender loris 93, 112, 263, 283, 105, 107, 189, 198, 209, 220, 234, 247, 263, 277
slow loris 94, 219
smaller panda 109
smooth Indian otter 113, 121, 205
snipe 192
snow cock 153; *also see*
Himalayan snow cock
Tibetan snow cock
snow leopard 19, 26, 149, 168, 169
Somawathiya National Park 287
sooty tern 163
Spanish sparrow 157
sparrow 157; *also see*
cinnamon sparrow
house sparrow
Spanish sparrow
sparrowhawk 161
sperm whale 164
spiny babbler 133
spiny-tail lizard 155, 161
spoonbill 235
spot-billed pelicans 292
spotted babbler 142
spotted deer
see barking deer
spotted dove 142
spotted linsang (mammal) 207
spotted munia 144
spotted owlet 161
spotted sandgrouse 157
spotted sandpiper 141
spur fowl 264
squirrel 107; *also see*
flying squirrel
giant squirrel
Malabar squirrel
Sri Lanka 15, 49, 69, 77, 283, 293
star tortoise 128, 193, 277
steppe eagle 153, 229, 254
stone curfew 193, 229
stone plover 141
stork 12, 13, 198, 205, 206, 217, 243, 227, 235; *also see*
adjutant stork
black-necked stork
strangler fig 204
stripe-backed weasel 114
striped hyena 70, 101, 104, 105
stripe-necked mongoose 112, 263
striped squirrel 113, 118; *also see*
dusky striped squirrel
five-striped palm squirrel
Himalayan striped squirrel
three-striped squirrel
stump-tailed macaque 94
Sumatra 71
Sumatran rhinocerous 77
Sumatran tiger 59
Sunbird 138, 199; *also see*
purple-rumped sunbird
purple sunbird
yellow-backed sunbird
Sunderbans 24, 26, 59, 61, 129;
sundervan 126
swamp 49
swamp deer
see barasingha
swamp partridge 199, 217

t

tahr

see Himalayan tahr
tailor bird 43, 139
takin (goat-antelope) 150
Tal area in Chitwan 204
Tal Chapar (salt flat) 157
Talgasmankade 291
tamarind 50
Tamil Nadu 22, 77
tank eagle 294
Taroba National Park 83
tawny eagle 153, 229
tawny fish owl 198
tea 19
teak 19, 49
teal 227, 250, 264; *see* Andaman teal
temperate forests 54
Terai (riverine grasslands & forests) 54, 59, 86, 89, 187, 253
Terminalia (tree) 51, 273
termites 108, 209
tern 163; *also see* noddy tern; sooty tern
Thannikudi rest house in Periyar 277
Thar (great Indian Desert) 19, 26, 155–161
Thirutai 163
thorn forset 49
Thotupoia peak (Sri Lanka) 295
three-striped palm squirrel 118
thrush 255, 264
Tibetan antelope 151
Tibetan blue bear 152
Tibetan gazelle 151
Tibetan snow cock 153
Tibetan wild ass 151, 160
Tibetan wolf 150
Tickell's blue flycatcher 140, 254
tidal swamp forest 52
tiger 5, 15, 35, 21, 44, 45, 56–65, 75, 187, 188, 197, 207, 215, 220, 233, 250, 251, 253, 263, 267, 268, 276; *also see* census; radio tracking 40; *also see* Balinese tiger; Caspian tiger; Chinese tiger; Indian tiger; Indo-Chinese tiger; Javan tiger; Siberian tiger; Sumatran tiger
Tiger Haven 199
tiger prawn 163
Tiger Tops Lodge 206
tiny-eared owl 268
toad agama horned toad
toque macaque 96, 98, 291
tortoise 128; *see* star tortoise
totemism 35
tourism 22
tracks 44, 211, 251
Tragopan pheasant 134
transmigration 30
Travancore flying squirrel 117
tree frogs 128
tree shrew 115
trekking 23
Trewia (tree) 54
Trincomalee 164
trinket (snake) 126
tribal dances 35
tropical rain forest 49, 53
Tulsishyam (temple) 243
turtle 25, 61, 128; *also see* black pond turtle; flap-shell turtle; green turtle; green sea turtle; hawksbill turtle; leatherback turtle; loggerhead turtle; olive ridley; sea turtle
tusket (elephant) 289
two-horned rhinocerous 289

u & v

Uda Walawe National Park 293
Idaygiri relief 30
ungulates (hoofed herbivores) 60, 68, 151
Uraniya plains 288
urial (shapu) 150
Uttar Pradesh 75, 77, 81, 84
Valley of Flower National Park 23
Vedanthangal Bird Sanctuary 126
Velavador National Park 88
Vepandeniya Rock (Leopard Rock) 289
villu (lake) 275
Vindhya mountain range 83
vine snake 125, 264
viper 193; *also see* **pit viper**; **Russel's viper**
Vishnu 30
votive offerings 35
vole 119; *also see* Royle's vole; Sikkim vole
vulture 43, 133, 144, 198, 250, 255; *also see* cinerious vulture; Egyptain vulture; king or black vulture; long-billed vulture; scavenger vulture; white-backed vulture

w

wader tracks of 38
wagtail 143, 192, 228; *also see* gray wagtail; large pied wagtail; white wagtail
wall creeper (bird) 153, 182, 210
warbler (bird) 157, 228
Wasgomuwa National Park 287
water buffalo 219
waterfowl 199
water holes 40, 62
water monitor 61, 127, 286
water snakes 124
weasel 114; *also see* ermine; Himalayan weasel; pale weasel; stripe-backed weasel; yellow-bellied weasel
weaver bird (Munia) 144, 229; *also see* red munia or avadavat; spotted munia; white-backed munia; white-throated munia
Weeravila Bird Sanctuary 287
West Asian or Persian lion 68
Western Ghats 19, 50, 87, 89, 273
Western Himalaya 54, 73
whale 164; *also see* baleen whale; blue whale; sperm whale
whale shark 165
whiskered tern 132
whistling teal 217
white-backed munia 144
white-backed vulture 144, 161, 193
white-bellied drongo 254

white-bellied sea eagle 143, 294
white-breasted kingfisher 142
white-checked bulbul 138, 157
white-footed fox 103
white-spotted fantail flycatcher 140
white-throated munia 144, 157
white prawn 163
white wagtail 143
white-winged wood duck 133
wigeon 227
wild ass
see Indian wild ass
wild boar 68, 109, 110, 180, 192, 207, 210, 216, 218, 229, 235, 242, 250, 254, 269, 273, 283
wild buffalo 42, 60, 68, 90, 215, 218, 283, 291
wild cat 242
wild dog (dhole) 70, 83, 86, 101, 104, 152, 189, 207, 209, 235, 250, 263, 268, 276
wild goat 150
wild ox 83, 89; *also see*
gaur
yak
wild pig 61, 109, 198, 262, 275; *also see*
Andaman wild pig
pigmy hog
wild boar
Wildlife Protection Act 71, 135
wild yak 89, 151
Wilpattu National Park 77, 285–287
wolf 102, 152, 160; *also see*
gray wolf
Tibetan wolf
wolf snake 126, 264
woodpecker 134, 199, 237; *also see*
golden-backed woodpecker
great slaty woodpecker
Malabar great black woodpecker
pied woodpecker
woodpigeon
see Andaman woodpigeon
World Wildlife Fund 190, 276
worm snake 124, 126
wren warbler 139; *also see*
ashy wren warbler
Indian warbler
Wynad sanctuary 268

x, y & z

Yala 39, 77, 280, 281
Block 2 Strict Natural Reserve 287
East National Park 293
West National Park; *see* Ruhuna
yellow-backed sunbird 138
yellow-bellied weasel 114
yellow-billed magpie 182
yellow-eared bulbul 295
yellow-fronted barbet 133
yellow grosbeak 180
yellow monitor lizard 128
yellow-throated marten 14, 179, 180
yellow wasp 263
yellow-wattled lapwing 144
zizyphus (tree) 50

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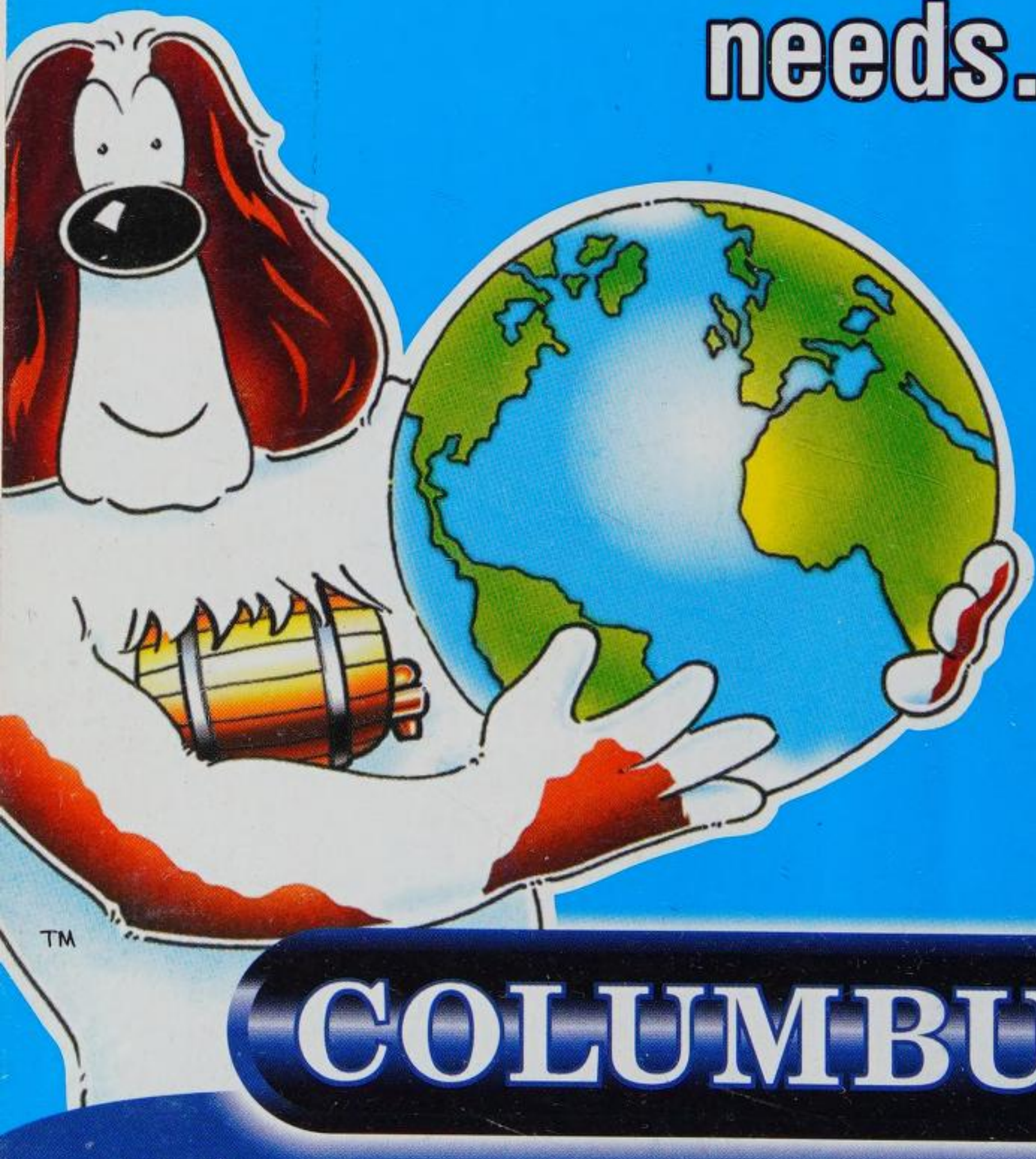

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Getting Acquainted

The Place 298
The Land 298
When to Go 298
Restricted & Protected Areas 298
Climate 299

Planning the Trip

What to Bring 301
Entry Regulations 301
Maps 301
Customs 302
Getting There 302
On Arrival 303
On Departure 303
Women Travelling Alone 303
Special Facilities 303
Gay & Lesbian Travellers 303
Indian Embassies 304
Indian Tourist Offices 304
Wildlife Societies 304
Useful Websites 305

Practical Tips

Emergencies 305
Health 305
Business Hours 307
Postal Services 307
Telecommunications 307
Poste Restante 307
Media 308
Courier Services 308
Repairs & Tailors 308
Photography 308

Getting Around

Travel by Air 309
Travel by Bus 309
Rickshaws 309
Taxis 310
Travel by Ship 310
Driving in India 310
Car & Taxi Rental 310
Travel by Rail 310
Reservation Forms 311

Wildlife Parks

India 312
Sri Lanka 337
Nepal 338

Language

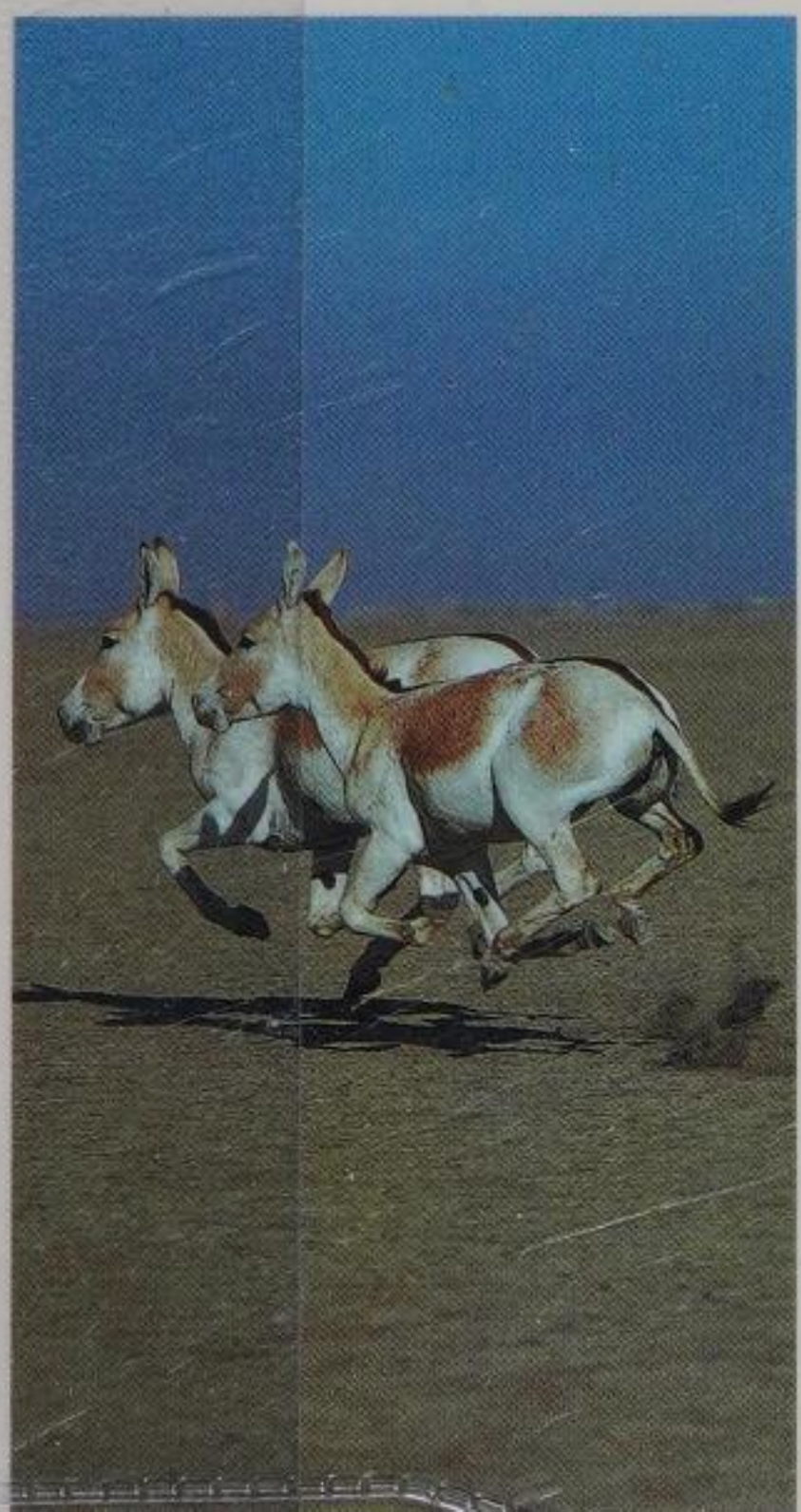
Traveller's Hindi 340
Traveller's Tamil 342

Further Reading

General Natural History & Mammals 343
Birds 345
Reptiles 346
Insects 346
Flowers & Trees 346
Other Insight Guides 347
Feedback 347

... and much more

Travel Tips Index 297



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